U.S. Department
of Commerce

January 2001

NOAA Technical Report NMFS 151
A Scientific Paper of the **FISHERY BULLETIN**

Cetaceans of Venezuela: Their Distribution and Conservation Status

Aldemaro Romero
A. Ignacio Agudo
Steven M. Green
Giuseppe Notarbartolo di Sciara

Library
NOAA, National Marine Fisheries Service
SWFC/Honolulu Laboratory F/SWC2
2570 Dole Street
Honolulu, HI 96822-2396

AA
n.
t.
FS
51

U.S. Department of Commerce

Donald L. Evans
Secretary

National Oceanic and Atmospheric Administration

Scott B. Gudes
Acting Under Secretary for Oceans and Atmosphere

National Marine Fisheries Service

William T. Hogarth
Acting Assistant Administrator for Fisheries

The *NOAA Technical Report NMFS* (ISSN 0892-8908) series is published by the Scientific Publications Office, National Marine Fisheries Service, NOAA, 7600 Sand Point Way N.E., Seattle, WA 98115-0070.

The Secretary of Commerce has determined that the publication of this series is necessary in the transaction of the public business required by law of this Department. Use of funds for printing of this series has been approved by the Director of the Office of Management and Budget.

NOAA Technical Reports NMFS

Scientific Papers of the **Fishery Bulletin**

Scientific Editor
Dr. John V. Merriner

Editorial Assistant
Sarah Shoffler

National Marine Fisheries Service, NOAA
101 Pivers Island Road
Beaufort, North Carolina 28516

Managing Editor
Shelley Arenas
Scientific Publications Office
National Marine Fisheries Service, NOAA
7600 Sand Point Way N.E.
Seattle, Washington 98115-0070

Editorial Committee
Dr. Andrew E. Dizon National Marine Fisheries Service
Dr. Linda L. Jones National Marine Fisheries Service
Dr. Richard D. Methot National Marine Fisheries Service
Dr. Theodore W. Pietsch University of Washington
Dr. Joseph E. Powers National Marine Fisheries Service
Dr. Tim D. Smith National Marine Fisheries Service

The *NOAA Technical Report NMFS* series of the *Fishery Bulletin* carries peer-reviewed, lengthy original research reports, taxonomic keys, species synopses, flora and fauna studies, and data- intensive reports on investigations in fishery science, engineering, and economics. The series was established in 1983 to replace two subcategories of the Technical Report series: "Special Scientific Report—Fisheries" and "Circular." Copies of the NOAA Technical Report NMFS are available free in limited numbers to government agencies, both federal and state. They are also available in exchange for other scientific and technical publications in the marine sciences. Reports are published online in PDF format at http://spo.nwr.noaa.gov.

NMFS Honolulu Library
00000000004879

NOAA Technical Report NMFS 151
A Technical Report of the *Fishery Bulletin*

Cetaceans of Venezuela: Their Distribution and Conservation Status

Aldemaro Romero
A. Ignacio Agudo
Steven M. Green
Giuseppe Notarbartolo di Sciara

January 2001

NOAA
Tech
Rept
NMFS
151

U.S. Department of Commerce
Seattle, Washington

Library
NOAA, National Marine Fisheries Service
SWFC Honolulu Laboratory F/SWC2
2570 Dole Street
Honolulu, HI 96822-2396

Suggested reference
Romero, Aldemaro, A. Ignacio Agudo, Steven M. Green, and Giuseppe Notarbartolo di Sciara. 2001. Cetaceans of Venezuela: their distribution and conservation status. U.S. Dep. Commer., NOAA Tech. Rep. NMFS 151, 60 p.

Online dissemination
This report is posted online in PDF format at http://spo.nwr.noaa.gov (click on *Technical Reports* link).

Purchasing additional copies
Additional copies of this report are available for purchase in paper copy or microfiche from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; 1-800-553-NTIS; http://www.ntis.gov.

Copyright law
Although the contents of the Technical Reports have not been copyrighted and may be reprinted entirely, reference to source is appreciated.

Proprietary products
The National Marine Fisheries Service (NMFS) does not approve, recommend, or endorse any proprietary product or proprietary material mentioned in this publication. No reference shall be made to NMFS, or to this publication furnished by NMFS, in any advertising or sales promotion which would indicate or imply that NMFS approves, recommends, or endorses any proprietary product or proprietary material mentioned herein, or which has as its purpose an intent to cause directly or indirectly the advertised product to be used or purchased because of this NMFS publication.

Cetaceans of Venezuela: Their Distribution and Conservation Status

Aldemaro Romero
Macalester College
Environmental Studies Program and Department of Biology
1600 Grand Ave.
Saint Paul, Minnesota 55105-1899
E-mail address: romero@macalester.edu

A. Ignacio Agudo
Fundacetacea, Fundación Sudamericana
"Saida Josefina Blondell de Agudo"
para la Conservación de Mamíferos Acuáticos
P. O. Box 010, 88010-970
Florianópolis, Santa Catarina-SC, Brazil

Steven M. Green
Department of Biology
University of Miami
P.O. Box 249118
Coral Gables, Florida 33124

Giuseppe Notarbartolo di Sciara
Hubbs-Sea World Research Institute
1700 South Shore Rd.
San Diego, California 92109
Present address: Tethys Research Institute
viale G.B. Gadio 2, I-20121
Milano, Italy

Abstract.—Sighting, stranding, and capture records of whales and dolphins for Venezuela were assembled and analyzed to document the Venezuelan cetacean fauna and its distribution in the eastern Caribbean. An attempt was made to confirm species identification for each of the records, yielding 443 that encompass 21 species of cetaceans now confirmed to occur in Venezuelan marine, estuarine, and freshwater habitats. For each species, we report its global and local distribution, conservation status and threats, and the common names used, along with our proposal for a Spanish common name. Bryde's whale (*Balaenoptera edeni*) is the most commonly reported mysticete. The long-beaked common dolphin (*Delphinus capensis*) is the most frequent of the odontocetes in marine waters. The boto or tonina (*Inia geoffrensis*) was found to be ubiquitous in the Orinoco watershed. The distribution of marine records is consistent with the pattern of productivity of Venezuelan marine waters, i.e., a concentration at 63°07'W through 65°26'W with records declining to the east and to the west. An examination of the records for all cetaceans in the Caribbean leads us to conclude that seven additional species may be present in Venezuelan waters.

Introduction

The cetaceans inhabiting the Caribbean are poorly known (Jefferson and Lynn, 1994). A few taxonomic papers on the Windward Islands region (largely summarized in Caldwell et al., 1971a) were a consequence of studying whaling in the area (Price, 1985). Most of the other publications have focused on a particular species or on sightings or strandings at a particular locality.

Surveys have been limited in scope and duration. Erdman et al. (1973) first surveyed the area's cetacean fauna, concentrating on the northeastern Caribbean. They identified seven species and noted the presence of twenty more that were not identified. Later van Bree (1975) confirmed 21 species in the southern Caribbean and estimated that an additional four would eventually be found. Casiños (1986) reported 24 confirmed species and predicted one more for the southeast Caribbean. Mignucci-Giannoni[1] reported 24 species for Puerto Rico and the Virgin Islands. Cuervo Díaz et al. (1986) cited eight confirmed species and 15 expected for the Colombian Caribbean and two species for the Colombian rivers. Prieto Rodríguez (1988) cited nine confirmed species for that same region. Vidal (1990) expanded the list to 15 ma-

[1] Mignucci-Giannoni, A. A. 1996. Marine mammals strandings in Puerto Rico and the United States and British Virgin Islands. Department of Marine Sciences, University of Puerto Rico, Mayaguez, 247 p., unpubl. doctoral dissertation.

rine species and predicted that at least one more would be found. Debrot et al. (1998) reviewed the records for the Leeward Dutch Antilles and confirmed 13 records for those islands. Examination of the distributional records of some species has led many investigators to predict that others are present in the Caribbean although they remain unreported (Caldwell et al., 1971a; van Bree, 1975; Cuervo Díaz et al., 1986; Perrin and Gilpatrick, 1994; Perrin and Hohn, 1994; Perrin et al., 1994a; Perrin et al., 1994c).

Although there have been some systematic aerial surveys of the area (e.g., Meade and Koehnken, 1991; Notarbartolo di Sciara[2]), they have been of limited duration. Other sources of knowledge about Venezuela's cetacean fauna are sparse in comparison to some other regions of the world because of two major factors: absence of an organized whaling industry and lack of interest by local naturalists. Foreigners have generated most of the information on cetaceans in Venezuela (Table 1). Romero et al. (1991) attempted the first comprehensive compilation of records of Venezuelan cetaceans, documenting 17 species. Later, Romero et al. (1997b) showed that cetacean utilization by Venezuelan fishermen was much more extensive than previously known, thus providing a basis for evaluating threats to the conservation status of Venezuelan species.

This paper summarizes all the records that we could locate or were made available to us regarding cetaceans in Venezuelan marine and freshwater environments. We present 443 records comprising reports of about 5,000 individual animals spanning 21 confirmed species. We interpret them, where possible, to suggest the conservation status of these species. This report updates and supplants Romero et al. (1991) and we therefore encourage referring to and citing this document rather than the earlier one.

Materials and methods

Area of coverage

Venezuelan coastal localities include both Caribbean and North Atlantic waters. We include all inland waters within Venezuela and marine waters within the territorial sea, namely the 670,000 km^2 of maritime space (Territorial Sea + Contiguous Zone + Inner Waters + Continental Margin + Continental Shelf + Exclusive Economic Zone) as defined by the Law of the Sea (cf. Romero, 1990).

[2] Notarbartolo di Sciara, G. 1979. Progress report July and August 1979. Hubbs-Sea World Research Institute, 1700 South Shore Rd., San Diego, California 92109, 2 p.

Data compilation

Data were compiled from both scientific and nontechnical literature, from collections of museums and similar institutions, and from unpublished sightings by reliable observers, including those using photographs or videotape recordings (Table 2). These embrace, but are not limited to, records of stranded, accidentally caught, and intentionally captured animals (see Romero et al., 1997b). We include in this compilation only those reports from scientific publications and popular accounts that provide sufficient information, such as clear descriptions, drawings, or photographs, to permit unambiguous species identification. Recognizing the problems of using sighting records for species identification (Evans, 1980), we include only those by qualified observers reporting very distinctive species such as humpback whales (*Megaptera novaeangliae*), killer whales (*Orcinus orca*), and sperm whales (*Physeter macrocephalus*). Original sources were used wherever possible; secondary sources are noted in brackets. All unpublished material has been deposited in the libraries of the International Whaling Commission (IWC, Cambridge, United Kingdom) and the University of Miami (Coral Gables, Florida).

We tried to independently verify the identification of every specimen in Venezuelan collections. Appendix 1 shows the list of institutions from which specimens were studied, their abbreviations and locations. We are aware there may be additional information at some institutions that was not made available to us [e.g., the unverified preliminary findings from the Caribbean Stranding Network (P.R.) reported by Díaz et al. (1995)].

Taxonomic arrangement

We follow the most recent cetacean species list and taxonomic order recognized by the IWC Scientific Committee (Perrin et al., 1994b) except for the position of the family Physeteridae where we follow Heyning (1995). Taxonomic ranks above the genus level follow Barnes et al. (1985). For the genus *Stenella*, we follow Perrin et al. (1987). Discussion of taxonomic status of species is included only when relevant to the nomenclature used in this paper. Taxonomic names of species follow Rice (1998) and the conventions of nomenclature and format are as recommended by the International Commission for Zoological Nomenclature.

Common or vernacular names

English names follow standard nomenclature (Perrin et al., 1994b). Spanish names are given in alphabetical order for each species. Those names that are used in Venezuela are preceded by an asterisk. For names used

Table 1

History of major developments in Venezuelan cetology.

Date	Development	Source
6,000–2,000 ybp	Utilization of cetaceans by aboriginals	Sanoja, 1989
1498	First cetacean sighting by a European. C. Columbus names the Paria Gulf as "Golfo de la Ballena" ("Whale's Gulf"), a feeding ground for whales.	Columbus, 1498
1647	First written description of a cetacean (*Inia geoffrensis*).	de Carvajal, 1648
1755	First scientific description of *I. geoffrensis*, by P. Lõfling. Manuscript remains unpublished to date.	Romero et al., 1997a
1782	First publication of a description of a Venezuelan cetacean (*I. geoffrensis*), by S. Gilij.	Gilij, 1782
1814	Publication of von Humboldt's encounter with *I. geoffrensis*, and possibly *Sotalia fluviatilis* and *Stenella longirostris*.	von Humboldt, 1814
1841	First report of *Physeter macrocephalus*. First report of a stranded cetacean for Venezuela.	Codazzi, 1841
1843	First report of whaling off the coast of Venezuela. Probably *P. macrocephalus*.	Anonymous, 1843
1853	First report of whaling of *Megaptera novaeangliae*.	Mitchell and Reeves, 1983
1868	First report for presence of *Delphinus capensis* (f. *delphis*).	Ernst, 1868
1873	First report of a balaenopterid, probably *Balaenoptera edeni*.	Ernst, 1877
1884	First report of commercial use of dolphin products.	Ernst, 1884
1891	First report of *Steno bredanensis* and, possibly, *Globicephala macrorhynchus*.	Ernst, 1891
1894	Report of whaling on *Orcinus orca*.	Reeves and Mitchell, 1988
1912	First confirmed report of *Sotalia fluviatilis*.	Osgood, 1912
1921	First report of *Pseudorca crassidens*.	Miller, 1921
1947	First technical report on dolphin fisheries in Venezuela.	Fiedler et al., 1947
1954	First report of *Balaenoptera physalus*, *Megaptera novaeangliae*, and *Tursiops truncates*.	Anduze, 1954
1963	First confirmed report of *B. physalus*.	Moore, 1968
1966	First report of *Stenella frontalis*.	Mitchell, 1970
1966	First confirmed report of *T. truncates*.	Caldwell and Caldwell, 1971b
1972	First confirmed report of *S. longirostris* and *D. capensis*.	van Halewijn and van Bree, 1972
1974	First confirmed report of *Balaenoptera borealis* and *Balaenoptera edeni*.	Mitchell and Kozicki[1]
1978	First confirmed report of *M. novaeangliae*.	Winn and Winn, 1978
1980	First report of *G. macrorhynchus*.	Casinos and Bou, 1980
1981	First published report of *Ziphius cavirostris*.	Casinos, 1981
1981	Pilleri and Pilleri suggest the presence of *Inia geoffrensis geoffrensis* and *I. g. humboldtiana* in Venezuela.	Pilleri and Pilleri, 1982
1990	First report of *Stenella clymene* in Venezuela.	Agudo, 1990
1991	First list of Venezuelan cetaceans based on actual records. First records for *Grampus griseus*, *Steno bredanensis*, and *Feresa attenuata*.	Romero et al., 1991
1993	First confirmed report of *B. physalus*.	Bolaños Jiménez and Lira, 1993
1993	First confirmed record of *O. orca*.	Rodríguez et al., 1993
1997	First comprehensive analysis of cetacean fisheries. First record of *S. coeruleoalba*.	Romero et al., 1997b This paper

[1] Mitchell, E. D., and V. M. Kozicki. 1974. The sei whale (*Balaenoptera borealis*) in the northwest Atlantic Ocean. IWC/SC/SP74/32, Arctic Biological Station, Fisheries and Marine Service, Department of the Environment, Box 400, Ste. Anne de Bellevue, Province de Quebec, Canada, 48 p., unpubl. manuscr.

exclusively in a particular region, the region is identified in parentheses.

Our sources for common or vernacular names in Spanish, and for Venezuela in particular, are interviews with local fishermen, the scientific bibliography (mostly Casinos, 1986; Vidal, 1990; Romero et al., 1991; Romero and Agudo, 1993), and popular literature written in Spanish on natural history in general and cetaceans in particular. There is not, however, a standard nomenclature for Spanish names. Some common names are literal translations from English that make little sense in Spanish. Others are used exclusively in one country or region.

Table 2

The locations for record numbers can be found on the species maps (Figs. 3 through 19). Marine records for Venezuela are given state-ized. State names are not used for offshore records nor for islands within the "Dependencias federales" (federal territories not assigned locality corresponds to the confluence of both rivers. A river followed by a non-capitalized name refers to a town and/or geographical If there is more than one record for a locality, they are ordered chronologically. When a locality is unspecific (e.g., "Venezuela" or "eastern Venezuela are provided when available. Within any one longitude, records are arranged by latitude from south to north. For identical garita Island"), then no coordinates are assigned.

Record	Species	Locality	Lat. °'N	Long. °'W
1	*B. borealis*	SUCRE: E. San Juan de Las Galdonas	10 44	62 50
2	*B. borealis*	N. ESPARTA: NE. Punta Ballena, Isla de Margarita	11 03	63 44
3	*B. borealis*	N. ESPARTA: E. Islote Farallón Blanco, Isla de Margarita	10 58	63 45
4	*B. edeni*	N. ESPARTA: NE. Islote Farallón Blanco, Isla de Margarita	11 00	63 44
5	*B. edeni*	N. ESPARTA: NE. Punta Ballena, Isla de Margarita	11 03	63 44
6	*B. edeni*	N. ESPARTA: NE. Punta Ballena, Isla de Margarita	11 03	63 44
7	*B. edeni*	N. ESPARTA: E. Islote Farallón Blanco, Isla de Margarita	10 58	63 45
8	*B. edeni*	N. ESPARTA: Pampatar, Isla de Margarita	11 00	63 48
9	*B. edeni*	N. ESPARTA: Punta de Piedras, Isla de Margarita	10 54	64 07
10	*B. edeni*	SUCRE: Caiguire, Golfo de Cariaco	10 29	64 08
11	*B. edeni*	N. ESPARTA: Ensenada de Charagato, Isla de Cubagua	10 49	64 10
12	*B. edeni*	N. ESPARTA: Boca del Río, Isla de Margarita	10 58	64 10
13	*B. edeni*	SUCRE: Península de Araya	10 35	64 17
14	*B. edeni*	SUCRE: Playa Colorada	10 25	64 18
15	*B. edeni*	Between Puerto La Cruz and Isla de Margarita	10 30	64 20
16	*B. edeni*	Between Puerto La Cruz and Porlamar	10 40	64 20
17	*B. edeni*	NW Isla Caracas and Picuda Grande	10 24	64 28
18	*B. edeni*	10 km N-NW Isla Caracas del Oeste	10 25	64 29
19	*B. edeni*	Between Puerto La Cruz and Isla de Margarita	10 30	64 30
20	*B. edeni*	La Blanquilla	11 55	64 35
21	*B. edeni*	ANZOATEGUI: Off Puerto La Cruz	10 15	64 38
22	*B. edeni*	SE La Tortuga	10 50	65 10
23	*B. edeni*	2 km NW I. La Tortuga	10 59	65 22
24	*B. edeni*	20 nautical miles E of La Orchila	11 49	65 48
25	*B. edeni*	MIRANDA: between Boca del Horno and Los Totumos	10 32	66 04
26	*B. physalus*	N. ESPARTA: Isla de Margarita		
27	*B. physalus*	N. ESPARTA: Playa El Silguero, Isla de Margarita	10 53	63 54
28	*B. physalus*	FALCON: E coast of the Península de Paraguana	11 43	69 46
29	*M. novaeangliae*	VENEZUELA		
30	*M. novaeangliae*	VENEZUELA		
31	*M. novaeangliae*	VENEZUELA		
32	*M. novaeangliae*	VENEZUELA		
33	*M. novaeangliae*	Los Testigos	11 25	63 05
34	*M. novaeangliae*	Betweeen El Morro de Puerto Santo and Los Testigos	11 00	63 07
35	*M. novaeangliae*	Isla de Aves	15 46	63 37
36	*M. novaeangliae*	Off Cumana	10 29	64 15
37	*M. novaeangliae*	Between Puerto La Cruz and Islas Chimanas	10 16	64 38
38	*M. novaeangliae*	La Tortuga	10 51	65 18
39	*M. novaeangliae*	MIRANDA: Between Carenero and Buche	10 31	66 06
40	*M. novaeangliae*	VARGAS: Playa La Salina, Puerto Carayaca	10 34	67 05
41	*P. macrocephalus*	VENEZUELA		
42	*P. macrocephalus*	VENEZUELAN CARIBBEAN		
43	*P. macrocephalus*	Between Puerto La Cruz and Punta Penas		
44	*P. macrocephalus*	N. ESPARTA: Isla de Margarita		
45	*P. macrocephalus*	Between El Morro de Puerto Santo and Los Testigos	11 00	63 07
46	*P. macrocephalus*	Between Los Testigos and Los Frailes	11 20	63 30

Table 2

by-state from east to west. Since Venezuela is administratively divided into "states" (in the U.S. sense), each state's name is fully capital- to any state). Freshwater records are ordered alphabetically by capitalized river name. Two such capitalized names indicate that the feature associated with the river. We have retained the original locality names and political units (states, districts) as much as possible. Venezuela"), it precedes any that are specific. Dates are shown by month (when available) followed by year. Map coordinates for coordinates, they are arranged chronologically beginning with the oldest record. When the location given is too imprecise (e.g., "Mar-

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
7/1991	1	2		R. Verginelli-Torres*
9/1966	1	>1		Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki[4]
2/1969	3	1		Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki[4]
9/1966	3	1		Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki[4]
6–7/1979	2	3		Mondolfi 1981
9/1966	1	>1		Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki[4]
2/1969	3	1		Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki[4]
1970	5	1	Museo del Mar, Boca de Rio	Casinos 1986, Agudo & Romero 1996
3/1979	5,7	1		Notarbartolo di Sciara 1983
8/1962	5	1		Flores 1977
1963	4,5	1	MEDIMAR n/n	Cagnolaro & Notarbartolo di Sciara 1979
8/1932	4,5	1	MCNC 1159	Bolaños Jiménez 1994, Agudo 1995
4/1974	4,5	1		Mondolfi[5]
8/1992	2	1		Picture seen by Agudo
11/1979	1,5	125 + 2		Notarbartolo di Sciara 1983
10–11/1977	1	86		Anonymous, text fn 4
9/1979	1	3		Gremone 1979b
9/1979	1	1		Gremone 1979b
11/1979	3	1		Watkins 1981
5/1993	4,5	1	MDMBR n/n	Bolaños Jiménez 1994, Agudo 1995
1979	2	1		Leatherwood et al. 1982
5/1989	1	1		I. Agudo**
1978	5	1		Notarbartolo di Sciara 1983
3/1989	1	1		I. Agudo**
8/1961	4,5	1	EBRG 11875	Agudo 1993
b. 1954	5	>1		Anduze[6]
8/1993	4,5,7?	1	EBRG 17779	Bolaños Jiménez & Lira 1994, Lira et al. 1995
2/1959	5	1		Agudo 1995, Lira et al. 1995
XIX Century	6	>1		Townsend 1935
1-4/1853	6	>1		Logbook bark Solon
1853	6	>~2		Logbook brig September
b. 1954	5	>1		Anduze[6]
10/1989	1	1		I. López*
9/1989	1	2		E. Marval*
3/1990	1	>1		G. Solé*
12/1870–4/1871	1,6	4		Logbook of the Thriver
4/1990	2	1		Anonymous 1990 (Rev. Producto (82):22, July)
2/1989	1	1		I. Agudo**
1960	5,6?	1		Romero & Agudo 1993, Agudo 1995
5/1990	2,4,5	1	LBCS n/n	Agudo & Romero 1996, Boher & Garci[7]
b. 1841	1			Codazzi 1841
b. 1877	1			Ernst 1877
8/1979	1	13		Notarbartolo di Sciara, text fn 2
b. 1886	4	1	MCNC n/n	Ernst 1886, Agudo & Romero 1996
9/1989	1	2		I. López*
b. 1967	1,6	>1		Vila 1967

continued

Table 2 (continued)

Record	Species	Locality	Lat. °'N	Long. °'W
47	*P. macrocephalus*	SUCRE: Ensenada Los Chivos, Playa Los Bordones	10 27	64 12
48	*P. macrocephalus*	SUCRE: Punta Arenas, Península de Araya	10 30	64 14
49	*P. macrocephalus*	La Blanquilla	11 49	64 37
50	*P. macrocephalus*	N. ESPARTA: Off Porlamar, Isla de Margarita	10 55	63 51
51	*P. macrocephalus*	ANZOATEGUI: Between Uchire and Boca de Unare	10 07	65 15
52	*P. macrocephalus*	Higuerote - Laguna de Tacarigua, near Rio Chico	10 20	65 57
53	*I. geoffrensis*	VENEZUELA		
54	*I. geoffrensis*	VENEZUELA		
55	*I. geoffrensis*	VENEZUELA		
56	*I. geoffrensis*	VENEZUELA		
57	*I. geoffrensis*	VENEZUELA		
58	*I. geoffrensis*	VENEZUELA		
59	*I. geoffrensis*	VENEZUELA		
60	*I. geoffrensis*	VENEZUELA		
61	*I. geoffrensis*	VENEZUELA		
62	*I. geoffrensis*	VENEZUELA		
63	*I. geoffrensis*	AGUARO: Playa del Sector La Vuelta del Oso		
64	*I. geoffrensis*	APURE		
65	*I. geoffrensis*	APURE		
66	*I. geoffrensis*	APURE		
67	*I. geoffrensis*	APURE		
68	*I. geoffrensis*	APURE		
69	*I. geoffrensis*	APURE		
70	*I. geoffrensis*	APURE		
71	*I. geoffrensis*	APURE	7 46	67 14
72	*I. geoffrensis*	APURE: Bogante	7 18	70 36
73	*I. geoffrensis*	APURE: El Perro	7 40	66 38
74	*I. geoffrensis*	APURE: Guaritico	7 53	68 51
75	*I. geoffrensis*	APURE: Guaritico	7 53	68 51
76	*I. geoffrensis*	APURE: above El Samán	7 52	68 42
77	*I. geoffrensis*	APURE: below Peñita	7 24	70 27
78	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
79	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
80	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
81	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
82	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
83	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
84	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
85	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
86	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
87	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
88	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
89	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
90	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
91	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
92	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
93	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
94	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
95	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
96	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
97	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
98	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30
99	*I. geoffrensis*	APURE: San Fernando de Apure	7 55	67 30

Table 2 (continued)

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
8/1988	4,5	1	MCNC 1160	Agudo 1995,b
3/1843	1			Logbook of Solon
1761–1920	1,6	>1		Townsend 1935
1984	1	1		J.C. Naser*
b. 1841	5			Codazzi 1841
1/1992	1	4		I. Agudo**
	4	1	EBRG CD36	Bolaños Jiménez 1994, Agudo & Romero 1996
	4	1	MCNC 251	Bolaños Jiménez 1994, Agudo & Romero 1996
b. 1868	1(?)			Ernst 1868
4/1967	4,6	1	LACM-LARLB 349	Smithsonian Institution Computer Files
4/1967	4,6	1	LACM-LARLB 351	Smithsonian Institution Computer Files
4/1967	4,6	1	LACM-LARLB 352	Smithsonian Institution Computer Files
4/1967	4,6	1	LACM-LARLB 441	Smithsonian Institution Computer Files
4/1968	4,6	1	LACM-LARLB 348	Smithsonian Institution Computer Files
4/1970	4,6	1	LACM-LARLB 350	Smithsonian Institution Computer Files
1990	4	1	MCNUSB n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
2/1989	3	2		R. Henández*
3/1647	1	>1		de Carvajal 1648
4/1757	1			MS #2824, folios 191-195, Biblioteca del Palacio Real, Madrid, Spain
b. 1841	1			Codazzi 1841
b. 1884	4			Ernst 1884
9/1893	4		UZM CN2	van Bree & Trebbau 1973
3/1981	1	122		Pilleri & Pilleri 1982
3/1983	6	2		Boede Wantzelius 1990
8/1989	1	52		Schnapp & Howroyd 1992
5/1986	1	3		Meade & Koehnken 1991
5/1986	1	5		Meade & Koehnken 1991
2/1979	1	3		Pilleri 1979
2/1979	1	2		Pilleri 1979
5/1986	1	1		Meade & Koehnken 1991
5/1986	1	2		Meade & Koehnken 1991
	4	1	MBUCV w/n	Agudo & Romero 1996
	4	1	USNM 395602	Smithsonian Institution Computer Files
	4	1	USNM 396166	Smithsonian Institution Computer Files
3/1800	1	>1		von Humboldt 1814
5/1966	4	1	MBUCV 135	Trebbau & van Bree 1974
5/1966	4, 6	1	ZMA 17771	ZMA data base
3/1968	4	1	USNM 571263	Smithsonian Institution Computer Files
3/1968	4	1	USNM 571264	Smithsonian Institution Computer Files
3/1968	4	1	USNM 571429	Smithsonian Institution Computer Files
4/1968	4, 6	1	CAS 15977	Smithsonian Institution Computer Files
4/1969	4	1	USNM 395415	Smithsonian Institution Computer Files
4/1969	4	1	USNM 395416	Smithsonian Institution Computer Files
3/1973	4,6	1	ZMA 16109	van Bree & Trebbau 1973, ZMA data base
b. 1974	1	1		Trebbau & van Bree 1974
b. 1974		5		Trebbau 1975
b. 1974	4	1	MCNC b	Trebbau & van Bree 1974
b. 1974	4	1	MCNC c	Trebbau & van Bree 1974
b. 1974	4	1	MCNC d	Trebbau & van Bree 1974
5/1974	4,6	1	ZMA 16936	MZA data base
3/1975	6	5		Ostenrath 1976, Schenkkan 1977, Sylvestre 1985
2/1979	1	4		Pilleri 1979
6/1985	1	1		Meade & Koehnken 1991

continued

Table 2 (continued)

Record	Species	Locality	Lat. °'N	Long. °'W
100	*I. geoffrensis*	APURE: E San Fernando de Apure	7 53	67 26
101	*I. geoffrensis*	APURE: 15 km W San Fernando de Apure	7 57	67 34
102	*I. geoffrensis*	APURE: 15 km W San Fernando de Apure	7 57	67 34
103	*I. geoffrensis*	APURE: 15 km W San Fernando de Apure	7 57	67 34
104	*I. geoffrensis*	APURE: 15 km W San Fernando de Apure	7 57	67 34
105	*I. geoffrensis*	APURE: 15 km W San Fernando de Apure	7 57	67 34
106	*I. geoffrensis*	APURE: 15 km W San Fernando de Apure	7 57	67 34
107	*I. geoffrensis*	APURE: From San Fernando de Apure to 45 km W	7 58	67 34
108	*I. geoffrensis*	APURE: Caicara del Orinoco	7 34	66 10
109	*I. geoffrensis*	APURITO	7 54	68 28
110	*I. geoffrensis*	APURITO	7 54	68 28
111	*I. geoffrensis*	ARAUCA (In front of El Yagual)	7 29	68 25
112	*I. geoffrensis*	ARAUCA (In front of El Yagual)	7 29	68 25
113	*I. geoffrensis*	ARO	7 56	64 14
114	*I. geoffrensis*	ATABAPO		
115	*I. geoffrensis*	ATABAPO		
116	*I. geoffrensis*	ATABAPO	4 00	67 45
117	*I. geoffrensis*	ATABAPO	4 00	67 45
118	*I. geoffrensis*	ATABAPO	4 00	67 45
119	*I. geoffrensis*	ATABAPO	4 00	67 45
120	*I. geoffrensis*	ATABAPO: GUAVIARE	4 04	67 37
121	*I. geoffrensis*	ATABAPO: TEMI	3 14	67 24
122	*I. geoffrensis*	BARIA	1 30	66 30
123	*I. geoffrensis*	BARIA: PASIMONI	1 24	66 27
124	*I. geoffrensis*	CAÑO GUARITICO	7 47	69 02
125	*I. geoffrensis*	CAÑO GUARITICO	7 47	69 02
126	*I. geoffrensis*	CAÑO GUARITICO	7 47	69 02
127	*I. geoffrensis*	CAÑO GUARITICO	7 47	69 02
128	*I. geoffrensis*	CAÑO GUARITICO	7 47	69 02
129	*I. geoffrensis*	CAÑO GUARITICO: Hato El Frío	7 49	68 54
130	*I. geoffrensis*	CAÑO GUARITICO: Hato El Frío	8 49	69 54
131	*I. geoffrensis*	CAÑO GUARITICO: Hato El Frío	9 49	70 54
132	*I. geoffrensis*	CAÑO LA TIGRA	7 42	69 46
133	*I. geoffrensis*	CAÑO MANATI	7 40	66 45
134	*I. geoffrensis*	CAPANAPARO		
135	*I. geoffrensis*	CAPANAPARO	7 02	67 28
136	*I. geoffrensis*	CASIQUIARE		
137	*I. geoffrensis*	CASIQUIARE		
138	*I. geoffrensis*	CASIQUIARE		
139	*I. geoffrensis*	CASIQUIARE		
140	*I. geoffrensis*	CASIQUIARE:Tamatama-San Carlos de Río Negro	3 10	65 51
141	*I. geoffrensis*	CASIQUIARE: before CAÑO MANOMI	2 00	66 00
142	*I. geoffrensis*	CASIQUIARE: PASIMONI	1 54	66 36
143	*I. geoffrensis*	CASIQUIARE: before CAÑO EL PERRO	2 00	66 10
144	*I. geoffrensis*	CASIQUIARE: Solano	1 58	66 56
145	*I. geoffrensis*	CAURA	1 32	65 00
146	*I. geoffrensis*	CAURA: Laguna de Paramuto, near Maipa	7 24	65 00
147	*I. geoffrensis*	CINARUCO	6 35	67 17
148	*I. geoffrensis*	CINARUCO	6 35	67 17
149	*I. geoffrensis*	CINARUCO	6 35	67 17
150	*I. geoffrensis*	CINARUCO		
151	*I. geoffrensis*	CUNAVICHITO	6 45	67 25
152	*I. geoffrensis*	GUANARE		

Table 2 (continued)

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
5/1986	1	3		Meade & Koehnken 1991
3/1966	6	1		Trebbau 1975
3/1966	6	1		Trebbau 1975
5/1966	6	1		Trebbau 1975
5/1966	6	1		Trebbau 1975
3-4/1968	4,6	1	FMNH 57819	Trebbau 1975, Smithsonian Institution Computer Files
3-4/1968	6	1		Trebbau 1975
7/1989	1	15		Schnapp & Howroyd 1992
8/1989	1	9		Schnapp & Howroyd 1992
5/1986	1	3		Meade & Koehnken 1991
8/1989	1	9		Schnapp & Howroyd 1992
9/1970	4	1	EBRG 1739	Bolaños Jiménez 1994, Agudo & Romero 1996
1978	5	40		Pilleri 1979
10/1984	1	2		Meade & Koehnken 1991
b. 1841	1			Codazzi 1841
b. 1868	1			Ernst 1868
5/1984	1	1		Meade & Koehnken 1991
8/1984	1	2		Meade & Koehnken 1991
10/1984	1	4-5		Meade & Koehnken 1991
1/1985	1	3		Meade & Koehnken 1991
4/1800	1	>1		von Humboldt 1814
4/1800	1	>1		von Humboldt 1814
b. 1988	1	5-6		O'Hanlon 1988
12/1970-1/1971	1	6		Pilleri 1979 +R. Hoogerstein
1970-1977	1	>1		Pilleri & Gihr 1977
b. 1974	1	>1		Trebbau & van Bree 1974
5/1986	1	6		Meade & Koehnken 1991
7/1987	6	1		Boede Wantzelius 1990
7/1987	6	1		Boede Wantzelius 1990
2/1979	1	1		Pilleri 1979
5/1984	4	1	MNHLS 6886	Bolaños Jiménez 1994, Agudo & Romero 1996
5/1984	4	1	MNHLS 6899	Bolaños Jiménez 1994, Agudo & Romero 1996
5/1986	1	1		Meade & Koehnken 1991
5/1986	1	>4		Meade & Koehnken 1991
1970–1977	1	>1		Pilleri & Gihr 1977
b. 1974	1			Trebbau & van Bree 1974
1851	1			Wallace 1889
b. 1877	1			Ernst 1877
b. 1891	1			Ernst 1891
1983	1	>1		Best & da Silva 1983
5/1981	1	8		Pilleri & Pilleri 1982
1981	1	2		Pilleri et al. 1982
1981	1	3		Pilleri et al. 1982
1981	1	3		Pilleri et al. 1982
b. 1988	1	1		O'Hanlon 1988
6/1985	1	2		Meade & Koehnken 1991
b. 1979	1			Pilleri 1979 + R. Hoogerstein*?
1970–1977	1			Pilleri & Gihr 1977
b. 1974	1			Trebbau & van Bree 1974
11/1982	1	>3		Meade & Koehnken 1991
11/1993–6/1994	1	489/972		McGuire & Winemiller 1998
8/1989	1	5		A. Romero & A. Mayayo**
1960–69	6	>1		Harrison & Brownell 1971

continued

Table 2 (continued)

Record	Species	Locality	Lat. °'N	Long. °'W
153	*I. geoffrensis*	GUANARE VIEJO		
154	*I. geoffrensis*	GUANARE: Near Arismendi	8 28	68 22
155	*I. geoffrensis*	GUARICO	7 55	67 28
156	*I. geoffrensis*	GUARICO	7 55	67 28
157	*I. geoffrensis*	GUAVIARITO (Trib. of the Manapiare, Amazonas state)		
158	*I. geoffrensis*	GUAVIARITO (Trib. of the Manapiare, Amazonas state)		
159	*I. geoffrensis*	MANAPIARE: San Juan, 163 km E Puerto Ayacucho	5 19	66 08
160	*I. geoffrensis*	MANAPIARE: San Juan de Manapiare	5 19	66 03
161	*I. geoffrensis*	MANAPIARE: N San Juan de Manapiare, Amazonas	5 21	66 03
162	*I. geoffrensis*	MAVACA	2 00	65 10
163	*I. geoffrensis*	NEGRO: Cucuy	1 14	66 50
164	*I. geoffrensis*	NEGRO: Solano	1 58	66 57
165	*I. geoffrensis*	ORINOCO		
166	*I. geoffrensis*	ORINOCO		
167	*I. geoffrensis*	ORINOCO		
168	*I. geoffrensis*	ORINOCO		
169	*I. geoffrensis*	ORINOCO		
170	*I. geoffrensis*	ORINOCO		
171	*I. geoffrensis*	ORINOCO		
172	*I. geoffrensis*	ORINOCO		
173	*I. geoffrensis*	ORINOCO (lower)		
174	*I. geoffrensis*	ORINOCO (lower)		
175	*I. geoffrensis*	ORINOCO (upper)		
176	*I. geoffrensis*	ORINOCO (upper)	3 55	67 05
177	*I. geoffrensis*	ORINOCO: APURE	7 37	66 24
178	*I. geoffrensis*	ORINOCO: APURE	7 37	66 24
179	*I. geoffrensis*	ORINOCO: APURE	7 37	66 24
180	*I. geoffrensis*	ORINOCO: ARATURE (Delta region)	8 34	61 00
181	*I. geoffrensis*	ORINOCO: ARO	7 58	64 11
182	*I. geoffrensis*	ORINOCO: Atabapo	4 04	67 43
183	*I. geoffrensis*	ORINOCO: Atabapo	4 04	67 43
184	*I. geoffrensis*	ORINOCO: Barrancas	8 41	62 12
185	*I. geoffrensis*	ORINOCO: Cabruta	7 40	66 13
186	*I. geoffrensis*	ORINOCO: between Cabruta and Ciudad Guayana		
187	*I. geoffrensis*	ORINOCO: Caicara del Orinoco	7 34	66 10
188	*I. geoffrensis*	ORINOCO: Caicara del Orinoco	7 34	66 10
189	*I. geoffrensis*	ORINOCO: below Caicara del Orinoco	7 33	66 22
190	*I. geoffrensis*	ORINOCO: CAÑO ARAGUAITO (Delta region)	8 50	61 33
191	*I. geoffrensis*	ORINOCO: CAÑO ARAGUAITO (Delta region)	8 50	61 33
192	*I. geoffrensis*	ORINOCO: CAÑO ARAGUAITO (Delta region)	8 50	61 33
193	*I. geoffrensis*	ORINOCO: CAÑO CARIDAD	3 35	66 42
194	*I. geoffrensis*	ORINOCO: CAÑO EL TORO (Delta region)	8 32	61 30
195	*I. geoffrensis*	ORINOCO: Castillito	4 19	67 46
196	*I. geoffrensis*	ORINOCO: Ciudad Bolivar	8 11	63 34
197	*I. geoffrensis*	ORINOCO: Ciudad Bolivar	8 11	63 35
198	*I. geoffrensis*	ORINOCO: Ciudad Bolivar	8 11	63 35
199	*I. geoffrensis*	ORINOCO: above Ciudad Guayana	8 22	62 36
200	*I. geoffrensis*	ORINOCO: Cunucunuma	3 11	66 01
201	*I. geoffrensis*	ORINOCO: Delta region	8 40	62 10
202	*I. geoffrensis*	ORINOCO: El Infierno	8 04	64 24
203	*I. geoffrensis*	ORINOCO: El Jobal (below SUAPURE)	6 38	67 00
204	*I. geoffrensis*	ORINOCO: Esmeralda	3 10	65 32
205	*I. geoffrensis*	ORINOCO: Esmeralda	3 10	65 32

Table 2 (continued)

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
4/1967	4	1	LACM 28257	Smithsonian Institution Computer Files
1970–1977	1			Pilleri & Gihr 1977
b. 1974	1			Trebbau & van Bree 1974
b. 1979	1			Pilleri 1979+R. Hoogerstein
2–3/1972	1			Pilleri 1979+ R. Hoogerstein
b. 1974	1			Trebbau & van Bree 1974
9/1967	4	1	USNM 406801	Handley 1976
9/1973	4,6	1	ZMA 17614	ZMA data base
9/1973	4,6	1	ZMA 17615	van Bree & Trebbau 1973, ZMA data base
11/1984	1	1		Meade & Koehnken 1991
1983	1			Best & da Silva 1983
8/1973	4,6	1	ZMA 17613	van Bree & Trebbau 1973
	1	>1		Best & da Silva 1989b
	4	1	LACM 54453	LACM data base
b. 1841	1			Codazzi 1841
b. 1868	1			Ernst 1868
b.1871	1	7-8		Appun 1871
b. 1877	1			Ernst 1877
b. 1891	1			Ernst 1891
1907?	1	>1		Mozans 1910
1755		1		Romero et al. 1997a
1983	1			Best & da Silva 1983
1851	1	>1		Wallace 1889
	1	2		Starkell 1988
4/1800	1			von Humboldt 1814
10/1984	1	>6		Meade & Koehnken 1991
5/1986	1	1		Meade & Koehnken 1991
10/1987	1	2		Meade & Koehnken 1991
10/1984	1	3		Meade & Koehnken 1991
1800	1	2		von Humboldt 1814
b. 1868	1			Ernst 1868
	1	>1		Best & da Silva 1989b
5/1986	1	2		Meade & Koehnken 1991
1757–1766	1	>1		Meade & Koehnken 1991
1970–1977	1			Pilleri & Gihr 1977
b. 1974	1			Trebbau & van Bree 1974
10/1984	1	1		Meade & Koehnken 1991
10/1987	1	2		Meade & Koehnken 1991
10/1989	1	>2		Meade & Koehnken 1991
10/1990	1	>3		Meade & Koehnken 1991
1981	1	4		Pilleri et al. 1982
10/1987	1	1		Meade & Kohenken 1991
1981	1	1		Pilleri et al. 1982
	1	4		Kasuya & Kajihara 1974
1970–1977	1			Pilleri et Gihr 1977
b. 1974	1			Trebbau & van Bree 1974
10/1990	1	1		Meade & Koehnken 1991
11/1984	1	>2		Meade & Koehnken 1991
	1	2		Kasuya (in litt.) (see Meade & Koehnken 1991)
b. 1986	2			Maraven 1986
10/1984	1	2		Meade & Koehnken 1991
	1			Best & da Silva 1989a
1983	1			Best & da Silva 1989a

continued

Table 2 (continued)

Record	Species	Locality	Lat. °′N	Long. °′W
206	*I. geoffrensis*	ORINOCO: Gallo	6 23	67 13
207	*I. geoffrensis*	ORINOCO: Guachapana (above VENTUARI)	3 52	67 04
208	*I. geoffrensis*	ORINOCO: Guachapana (above VENTUARI)	3 52	67 04
209	*I. geoffrensis*	ORINOCO: Guachapana (above VENTUARI)	3 52	67 04
210	*I. geoffrensis*	ORINOCO: GUAVIARE	4 00	67 40
211	*I. geoffrensis*	ORINOCO: GUAVIARE	4 00	67 40
212	*I. geoffrensis*	ORINOCO: GUAVIARE	4 00	67 40
213	*I. geoffrensis*	ORINOCO: Isla Carnaban	4 11	67 15
214	*I. geoffrensis*	ORINOCO: Isla del Pato	3 18	66 33
215	*I. geoffrensis*	ORINOCO: Laguna de Monduapo	4 54	67 47
216	*I. geoffrensis*	ORINOCO: Las Bonitas	7 51	65 38
217	*I. geoffrensis*	ORINOCO: below Las Bonitas	7 51	65 38
218	*I. geoffrensis*	ORINOCO: below Las Bonitas	7 51	65 38
219	*I. geoffrensis*	ORINOCO: above Mapire	7 44	64 43
220	*I. geoffrensis*	ORINOCO: above Mapire	7 44	64 43
221	*I. geoffrensis*	ORINOCO: above Mapire	7 44	64 43
222	*I. geoffrensis*	ORINOCO: META	6 18	67 30
223	*I. geoffrensis*	ORINOCO: META	6 10	67 30
224	*I. geoffrensis*	ORINOCO: META	6 10	67 30
225	*I. geoffrensis*	ORINOCO: META	6 10	67 30
226	*I. geoffrensis*	ORINOCO: META	6 10	67 30
227	*I. geoffrensis*	ORINOCO: META	6 10	67 30
228	*I. geoffrensis*	ORINOCO: Monduapo (above VICHADA)	4 45	67 47
229	*I. geoffrensis*	ORINOCO: OCAMO	2 47	65 12
230	*I. geoffrensis*	ORINOCO: above OCAMO	2 50	65 14
231	*I. geoffrensis*	ORINOCO: Platanal	2 25	64 54
232	*I. geoffrensis*	ORINOCO: Puerto Ayacucho	5 40	67 35
233	*I. geoffrensis*	ORINOCO: Puerto Ayacucho	5 40	67 35
234	*I. geoffrensis*	ORINOCO: Puerto Ayacucho	5 40	67 35
235	*I. geoffrensis*	ORINOCO: near Sacupana	8 39	61 48
236	*I. geoffrensis*	ORINOCO: San Fernando de Atabapo	4 03	67 41
237	*I. geoffrensis*	ORINOCO: Santa María del Orinoco	6 36	67 08
238	*I. geoffrensis*	ORINOCO: Santa Bárbara del Orinoco	3 46	67 02
239	*I. geoffrensis*	ORINOCO: Santa Bárbara del Orinoco	3 46	67 02
240	*I. geoffrensis*	ORINOCO: Santa Bárbara del Orinoco	3 46	67 02
241	*I. geoffrensis*	ORINOCO: Santa Bárbara del Orinoco	3 46	67 02
242	*I. geoffrensis*	ORINOCO: Tamatama (confluence with CASIQUIARE)	3 08	65 51
243	*I. geoffrensis*	ORINOCO: Tamatama (confluence with CASIQUIARE)	3 08	65 51
244	*I. geoffrensis*	ORINOCO: Tamatama (confluence with CASIQUIARE)	3 08	65 51
245	*I. geoffrensis*	ORINOCO: Tamatama (confluence with CASIQUIARE)	3 08	65 51
246	*I. geoffrensis*	ORINOCO: Tití	3 57	67 23
247	*I. geoffrensis*	ORINOCO: Tití	3 57	67 23
248	*I. geoffrensis*	ORINOCO: TOMO	5 22	67 48
249	*I. geoffrensis*	ORINOCO: between Venado and Tamatama	3 03	65 55
250	*I. geoffrensis*	ORINOCO: VICHADA	4 56	67 48
251	*I. geoffrensis*	PARGUAZA	6 13	67 06
252	*I. geoffrensis*	PASIMONI: BARIA	1 25	66 25
253	*I. geoffrensis*	PORTUGUESA	8 05	67 37
254	*I. geoffrensis*	PORTUGUESA: near Guadarrama	8 30	68 02
255	*I. geoffrensis*	PORTUGUESA: near Guadarrama	8 30	68 02
256	*I. geoffrensis*	RAUDAL WAICA/CODAZZI (GUACA) Amazonas	2 01	64 01
257	*I. geoffrensis*	SARARE: above Guasdualito	7 19	70 42
258	*I. geoffrensis*	SURIPA	7 49	69 58

Table 2 (continued)

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
1981	1	1		Pilleri et al. 1982
4/1984	1	2		Meade & Koehnken 1991
5/1984	1	1		Meade & Koehnken 1991
5/1984	1	1		Meade & Koehnken 1991
4/1800	1			von Humboldt 1814
b. 1841	1			Codazzi 1841
b. 1868	1			Ernst 1868
1981	1	1		Pilleri et al. 1982
1981	1	2		Pilleri et al. 1982
1981	1	3		Pilleri et al. 1982
3/1887	1	12		Chaffanjon 1889
10/1984	1	2		Meade & Koehenken 1991
10/1984	1	1		Meade & Koehenken 1991
6/1986	1	>2		Meade & Koehenken 1991
4/1989	1	3		Meade & Koehenken 1991
4/1989	1	2		Meade & Koehenken 1991
				Kasuya & Kajihara 1974
	4	1	ICNB 3703	Casinos & Ocana 1979
5/1897	1			Bürger 1900
6/1984	1	3		Meade & Koehnken 1991
6/1986	1	1		Meade & Koehnken 1991
1983	1	2		Meade & Koehenken 1991
4/1984	1	1		Meade & Koehenken 1991
11/1984	1	>3		Meade & Koehenken 1991
11/1984	1	1		Meade & Koehenken 1991
11/1984	1	>3		Meade & Koehenken 1991
1970–1977	1			Pilleri & Gihr 1977
b. 1974	1			Trebbau & van Bree 1994
1983–1986	1	-3		Meade & Koehnken 1991
b. 1974	1			Trebbau & van Bree 1974
1981	1	2		Pilleri et al. 1982
3/1993	4	1	EBRG 17458	Bolaños Jiménez 1994, Agudo & Romero 1996
1981	1	1		Pilleri et al. 1982
4/1984	1	1		Meade & Koehnken 1991
6/1984	1	3		Meade & Koehnken 1991
1/1985	1	1		Meade & Koehnken 1991
	4	1	EBRG 4128	Bolaños Jiménez 1994
5/1967	4,6	1	USNM 406802	Handley 1976
11/1984	1	3		Meade & Koehnken 1991
1989	4	1	MCNUSB w/n	Bolaños Jiménez 1994, Agudo & Romero 1996
9/1984	1	2		Meade & Koehnken 1991
6/1986	1	1		Meade & Koehnken 1991
6/1985	1	4-5		Meade & Koehnken 1991
4/1981	1	12		Pilleri & Pilleri 1992
10/1984	1	>3		Meade & Koehnken 1991
1983	1	3		Meade & Koehnken 1991
b. 1988	1	>1		O'Hanlon 1988
5/1986	1	2		Meade & Koehnken 1991
1970–1977	1			Pilleri & Gihr 1977
1974	1			Trebbau & van Bree 1974
8/1951	1			Anduze 1960
5/1986	1	1		Meade & Koehnken 1991
5/1986	1	2		Meade & Koehnken 1991

continued

Table 2 (continued)

Record	Species	Locality	Lat. °'N	Long. °'W
259	*I. geoffrensis*	TEMI	3 15	67 25
260	*I. geoffrensis*	TEMI: TUAMINI	3 14	67 23
261	*I. geoffrensis*	VENTUARI: San Juan	5 21	66 03
262	*I. geoffrensis*	VENTUARI: San Juan	5 21	66 03
263	*I. geoffrensis*	VENTUARI: Kanaripó	4 05	66 51
264	*I. geoffrensis*	VENTUARI: Kanaripó	4 05	66 51
265	*I. geoffrensis*	VENTUARI: Kanaripó	4 05	66 51
266	*I. geoffrensis*	VENTUARI: Kanaripó	4 05	66 51
267	*I. geoffrensis*	VENTUARI: Kanaripó	4 05	66 51
268	*I. geoffrensis*	Isla de Margarita		
269	*S. bredanensis*	VENEZUELA: Caribbean		
270	*S. bredanensis*	SUCRE: Ensenada de Tigrillo	10 22	64 23
271	*S. fluviatilis*	VENEZUELA		
272	*S. fluviatilis*	DELTA DEL ORINOCO: Orinoco-Arature confluence	8 36	60 54
273	*S. fluviatilis*	DELTA DEL ORINOCO: Cano Araguaito	8 50	61 33
274	*S. fluviatilis*	DELTA DEL ORINOCO: Cano Araguaito	8 50	61 33
275	*S. fluviatilis*	DELTA DEL ORINOCO: Cano Araguaito	8 50	61 33
276	*S. fluviatilis*	SUCRE: RÍO SAN JUAN, Golfo de Paria	10 06	62 38
277	*S. fluviatilis*	BOLIVAR: ORINOCO above Ciudad Guayana	8 22	62 36
278	*S. fluviatilis*	SUCRE: CAÑO GUARIQUEN	10 24	62 53
279	*S. fluviatilis*	SUCRE: RÍO MANZANARES	10 27	64 10
280	*S. fluviatilis*	ORINOCO: Vuelta del Torno, Isla del Infierno	8 04	64 24
281	*S. fluviatilis*	ORINOCO: La Esmeralda	3 10	65 32
282	*S. fluviatilis*	ORINOCO: between Cabruta and Caicara	7 40	66 15
283	*S. fluviatilis*	VARGAS		
284	*S. fluviatilis*	FALCON: Playa Sixto, La Vela de Coro	11 28	69 35
285	*S. fluviatilis*	FALCON: mouth RÍO CORO	11 28	69 35
286	*S. fluviatilis*	ZULIA		
287	*S. fluviatilis*	ZULIA: Canada de Hamburgo, Estrecho Lago de Maracaibo	10 35	71 35
288	*S. fluviatilis*	ZULIA: Lago de Maracaibo	10 00	71 40
289	*S. fluviatilis*	ZULIA: Lago de Maracaibo	10 00	71 40
290	*S. fluviatilis*	ZULIA: Lago de Maracaibo	10 00	71 40
291	*S. fluviatilis*	ZULIA: Lago de Maracaibo	10 00	71 40
292	*S. fluviatilis*	ZULIA: 15 km N Caimare Chico, Municipio Páez	11 40	71 40
293	*S. fluviatilis*	ZULIA: 15 km N Caimare Chico, Municipio Páez	11 40	71 40
294	*S. fluviatilis*	ZULIA: 15 km N Caimare Chico, Municipio Páez	11 40	71 40
295	*S. fluviatilis*	ZULIA: 15 km N Caimare Chico, Municipio Páez	11 40	71 40
296	*S. fluviatilis*	ZULIA: 15 km N Caimare Chico, Municipio Páez	11 40	71 40
297	*S. fluviatilis*	ZULIA: South Lago de Maracaibo	9 15	71 45
298	*S. fluviatilis*	ZULIA: Boca de la Laguna La Paloma	9 30	71 50
299	*S. fluviatilis*	ZULIA: Boca de la Laguna La Paloma	9 30	71 50
300	*S. fluviatilis*	ZULIA: San Isidro, Laguna de Lagunetas	9 30	71 55
301	*S. fluviatilis*	ZULIA: San Isidro, Laguna de Lagunetas	9 30	71 55
302	*S. fluviatilis*	ZULIA: San Isidro, Laguna de Lagunetas	9 30	71 55
303	*S. fluviatilis*	ZULIA: San Isidro, Laguna de Lagunetas	9 30	71 55
304	*S. fluviatilis*	ZULIA: San Isidro, Laguna de Lagunetas	9 30	71 55
305	*S. fluviatilis*	ZULIA: Ologa	9 30	72 00
306	*S. fluviatilis*	ZULIA: Ologa	9 30	72 00
307	*S. fluviatilis*	ZULIA: Rio Zulia, confluence with Catatumbo	9 04	72 17
308	*G. griseus*	La Blanquilla Is.	11 48	64 37
309	*G. griseus*	Ensenada El Falucho, La Blanquilla Is.	11 49	64 38
310	*T. truncatus*	SUCRE: Boca de Drago	10 44	61 48
311	*T. truncatus*	SUCRE: Boca de Drago	10 44	61 48

Table 2 (continued)

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
4/1800	1			von Humboldt 1814
5/1800	1			von Humboldt 1814
1983	1	>3		Meade & Koehnken 1991
7/1983	1	>3		Meade & Koehnken 1991
4/1984	1	2		Meade & Koehnken 1991
5/1984	1	1		Meade & Koehnken 1991
5/1984	1	>3		Meade & Koehnken 1991
8/1984	1	1		Meade & Koehnken 1991
6/1986	1	1		Meade & Koehnken 1991
	4	1	MCNC 215	Trebbau & van Bree 1974
	1	1		Ernst 1981
8/1986	2, 5	1		Agudo 1995
	6	>1		Northridge 1984
10/1990	1	>4		Meade & Koehnken 1991
10/1987	1	>5		Meade & Koehnken 1991
10/1989	1	>2		Meade & Koehnken 1991
10/1990	1	>2		Meade & Koehnken 1991
8/1978	1	3		Mondolfi & Muller[8]
10/1990	1	2		Meade & Koehnken 1991
3/1990	1	2		A. Martínez and D. Mueler*
7/1799	1	>1		von Humboldt 1814
4/1986–3/1987	2	>1		Maraven
1/1990	1	>1		Borobia et al. 1991 + J. Ojasti*
1/1990	1	>1		Borobia et al. 1991 + J. Ojasti*
	4	1	MBUCV 136	A. Mayayo**
2/1985	4	1	MCIMAR n/n	Agudo et al. 1994
1960's	1	>1		J. Coty*
b. 1996	?	4		Alvarado et al. 1995
5/1985	5,6	1	MBLUZ-M-0006	Agudo et al. 1994
6/1911	4	1	FMNH 18801	Osgood 1912, Borobia et al. 1991
6/1911	4	1	FMNH 18802	Osgood 1912, Borobia et al. 1991
5/1912	4	1	FMNH 34906	Borobia et al. 1991
5, 1912	4	1	FMNH 34907	Borobia et al. 1991
3/1977	5	1	MCIBLUZ-M-775	Agudo et al. 1994
3/1977	5	1	MCIBLUZ-M-776	Agudo et al. 1994
3/1977	5	1	MCIBLUZ-M-777	Agudo et al. 1994
3/1987	5	1	MCIBLUZ-M-7710	Agudo et al. 1994
1989	5	1	MCIBLUZ-M-0152	Agudo et al. 1994
1987	1	>1		Duarte Leal 1991
4/1991	5	1	MBLUZ-M-0165	Agudo et al. 1994
4/1991	1	>1		Rodríguez et al. 1993
2/1981	5	1	EBRG 2748	Casinos et al. 1981
2/1981	5	1	EBRG n/n	Casinos et al. 1981
2/1981	5	1	MBUCV 2819	Casinos et al. 1981, da Silva & Best 1994
2/1981	4	1	EBRG CD 38	Bolaños Jiménez 1994, Agudo & Romero 1996
11/1981	4	1	EBRG 2891	Bolaños Jiménez 1994, Agudo & Romero 1996
4/1991	5	1	EBRG 17056	Bolaños Jiménez 1994, Agudo & Romero 1996
b. 1993	3	8		Caballero 1992
1990	1	5		Agudo 1995
8/1988	7	1	MCNUSB n/n	Romero et al. 1991
8/1988	1	>1		Agudo 1995b
1988	4	1	EBRG 10836	Romero et al. 1991
1988	4	1	EBRG 10837	Romero et al. 1991

continued

Table 2 (continued)

Record	Species	Locality	Lat. °'N	Long. °'W
312	*T. truncatus*	SUCRE: Boca de Drago	10 44	61 48
313	*T. truncatus*	N. ESPARTA: Playa Pampatar	10 59	63 48
314	*T. truncatus*	N. ESPARTA: Southern beach, Municipio Tubores	10 53	64 05
315	*T. truncatus*	N. ESPARTA: Isla de Margarita	11 00	64 05
316	*T. truncatus*	N. ESPARTA: Cubagua	10 48	64 10
317	*T. truncatus*	SUCRE: Off Cumaná	10 29	64 11
318	*T. truncatus*	SUCRE: Playa Los Uveros, Carúpano	10 40	64 15
319	*T. truncatus*	SUCRE: Off Araya beaches, Península de Araya	10 35	64 17
320	*T. truncatus*	SUCRE: Golfo de Santa Fé	10 15	64 25
321	*T. truncatus*	La Blanquilla	10 50	64 37
322	*T. truncatus*	ANZOATEGUI: Mouth of RIO UNARE	10 06	65 12
323	*T. truncatus*	MIRANDA: Carenero-Buche-Los Totumos	10 30	66 05
324	*T. truncatus*	VARGAS: Balneario Naiguatá	10 38	66 44
325	*T. truncatus*	FALCON: Isla de Pájaros	10 50	68 15
326	*T. truncatus*	FALCON: Isla de Pájaros	10 50	68 15
327	*T. truncatus*	FALCON: Isla de Pájaros	10 50	68 15
328	*T. truncatus*	ZULIA		
329	*T. truncatus*	ZULIA: Caimare Chico, Distrito Páez	11 40	71 40
330	*S. frontalis*	VENEZUELA		
331	*S. frontalis*	VENEZUELA	10 57	61 34
332	*S. frontalis*	VENEZUELA	11 02	61 54
333	*S. frontalis*	VENEZUELA	11 02	61 54
334	*S. frontalis*	VENEZUELA	11 00	62 07
335	*S. frontalis*	VENEZUELA	11 25	62 22
336	*S. frontalis*	SUCRE: El Morro de Puerto Santo	10 44	63 09
337	*S. frontalis*	SUCRE: El Morro de Puerto Santo	10 44	63 09
338	*S. frontalis*	VENEZUELA	11 00	64 00
339	*S. frontalis*	N. ESPARTA: Ensenada La Guardia, Isla de Margarita	11 03	64 12
340	*S. frontalis*	SUCRE: Golfo de Santa Fe	10 15	64 25
341	*S. frontalis*	Isla La Tortuga	10 57	65 13
342	*S. frontalis*	Isla La Tortuga	10 56	65 18
343	*S. frontalis*	ANZOATEGUI: Boca de Uchire	10 09	65 26
344	*S. frontalis*	VARGAS: N Cabo Codera	10 36	66 03
345	*S. frontalis*	VENEZUELA	10 52	66 28
346	*S. frontalis*	VENEZUELA	10 52	66 28
347	*S. frontalis*	VENEZUELA	10 41	66 00
348	*S. frontalis*	FALCON: Playa Sixto, La Vela de Coro	11 28	69 35
349	*S. frontalis*	ZULIA		
350	*S. frontalis*	ZULIA: Isla San Carlos, N shore, Municipio Insular Padilla	10 59	71 36
351	*S. frontalis*	ZULIA: Isla San Carlos, N shore, Municipio Insular Padilla	10 59	71 36
352	*S. frontalis*	ZULIA: Caimare Chico, Municipio Páez	11 40	71 40
353	*S. attenuata*	ANZOATEGUI		
354	*S. longirostris*	VENEZUELA		
355	*S. longirostris*	SUCRE: El Morro de Puerto Santo	10 44	63 09
356	*S. longirostris*	SUCRE: El Morro de Puerto Santo	10 44	63 09
357	*S. longirostris*	SUCRE: El Morro de Puerto Santo	10 44	63 09
358	*S. longirostris*	SUCRE: Off Turpialito, Golfo de Cariaco	10 26	64 02
359	*S. longirostris*	N. ESPARTA: Isla de Margarita	11 00	64 05
360	*S. longirostris*	SUCRE: Off RÍO MANZANARES mouth, Cumaná	10 28	64 11
361	*S. longirostris*	SUCRE: Punta Arenas, Peninsula de Araya	10 30	64 14
362	*S. longirostris*	SUCRE: Punta Arenas, Peninsula de Araya	10 30	64 14
363	*S. longirostris*	SUCRE: Bahia de Mochima	10 21	64 21
364	*S. longirostris*	SUCRE: Golfo de Santa Fé, Parque Nacional Mochima	10 19	64 25

Table 2 (continued)

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
1988	4	1	EBRG 10838	Romero et al. 1991
3/1990	5	1		Agudo 1995
1960–1961	5	1	MDMBR n/n	Bolaños Jiménez 1994
b. 1981	1,6	>1		Cervigón & Velásquez 1981
4/1970	4	1	Fundación La Salle	Casinos 1986
3/1990	1	>1		I. Agudo**
5/1990	5	1		Agudo 1995
4/1990	2	~50		C.J. Rodríguez-Blondell*
3/1990	3, 6	1		Agudo 1995
3/1966	7	1		Caldwell & Caldwell 1971b
	5	1	MHNLS n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
1973	1	12		J. Sánchez*
4/1962	3, 5	1		Agudo 1995
9/1986	1,7	30		Tami et al. 1987
9/1986	4	1	EBRG 13639	Romero et al. 1991
9/1986	4	1	EBRG 15484	I. Agudo**
b. 1996	?	4		Alvarado et al. 1995
7/1977	5	1	CVTLUZ-MAM-778	Agudo et al. 1994
	4	1	MCNUSB n/n	A.I. Agudo**
	4	1	EDM 710	Perrin et al. 1987
2/1969	4	1	AMNH 239112	Perrin et al. 1987
2/1969	4	1	AMNH 239114	Perrin et al. 1987
2/1972	1	12-15		Taruski & Winn 1976
2/1972	1	12		Taruski & Winn 1976
8/1988	4,6	1	EBRG 16884	Agudo 1990, Romero et al. 1991
8/1988	4,6	1	EBRG 16889	Agudo 1990, Romero et al. 1991
	1			Perrin et al. 1987
1991	5	1	MEDIMAR n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
9/1988	3, 6	1		H. Ramírez Nahim*
1/1998	5	>100		Bolaños & Boher 1998
5/1990	1	25		A. Martínez, R. Verginelli-Torres*
1989	5	1	MCNUSB n/n	Agudo 1995
9/1989	2			Rev. Business Venezuela Kersher 1991 + H. Ramírez Nahim
9/1966	4	1	AMNH 239113	Perrin et al. 1987
	4	1	EDM 706	Perrin et al. 1987
	4	2	ZMA n/n	Perrin et al. 1987
3/1990	4,5	1	MCIMAR n/n	Agudo 1995
b. 1996	?	4		Alvarado et al. 1995
6/1900	4	1	IC n/n	Agudo et al. 1994
4/1994	4,5	1	IC n/n	Agudo et al. 1994
1991	4	1	IC n/n	Agudo et al. 1994
1979	1	2		G. Notarbartolo di Sciara**
1969	2	3		Leatherwood et al. 1976
8/1988	4,6	1	EBRG 16885	Agudo 1990, Romero et al. 1991
8/1988	4,6	1	EBRG 16886	Agudo 1990, Romero et al. 1991
8/1988	4,6	1	EBRG 16888	Agudo 1990, Romero et al. 1991
1989	1	>1		I. Agudo**
11/1979	1	150-400		Perrin et al. 1981
5/1990	1	13		R. Verginelli-Torres*
11/1799	1	15-16		von Humboldt 1814
2/1990	1	6		A.I. Agudo**
8/1990	1	26		I. Agudo**
10/1986	3	1		Siglo 21, Cumana

continued

Table 2 (continued)

Record	Species	Locality	Lat. °'N	Long. °'W
365	*S. longirostris*	ANZOATEGUI: W Isla Caracas del Este	10 16	64 27
366	*S. longirostris*	ANZOATEGUI: Puerto La Cruz	10 13	64 38
367	*S. longirostris*	ANZOATEGUI: Puerto La Cruz-Punta Peñas	10 16	64 38
368	*S. longirostris*	VARGAS: Punta El Caribe, Camurí Chico	10 38	66 42
369	*S. longirostris*	Isla de Barlovento, Archipiélago Las Aves	11 58	67 27
370	*S. longirostris*	NE Paraguaná- I. Aves de Sotavento-Arch. Las Aves	12 00	67 40
371	*S. clymene*	SUCRE: El Morro de Puerto Santo	10 44	63 09
372	*S. coeruleoalba*	5 nautical mi. S La Blanquilla Is.	10 43	64 35
373	*S. coeruleoalba*	15 nautical mi. SW La Blanquilla Is.	11 40	64 50
374	*S. coeruleoalba*	VENEZUELA	12 55	67 00
375	*D. capensis*	VENEZUELA		
376	*D. capensis*	VENEZUELA		
377	*D. capensis*	VENEZUELA		
378	*D. capensis*	VENEZUELA		
379	*D. capensis*	VENEZUELA		
380	*D. capensis*	VENEZUELA		
381	*D. capensis*	VENEZUELA		
382	*D. capensis*	SUCRE: El Morro de Puerto Santo	10 44	63 09
383	*D. capensis*	SUCRE: El Morro de Puerto Santo	10 44	63 09
384	*D. capensis*	SUCRE: El Morro de Puerto Santo	10 44	63 09
385	*D. capensis*	SUCRE: El Morro de Puerto Santo	10 44	63 09
386	*D. capensis*	SUCRE: El Morro de Puerto Santo	10 44	63 09
387	*D. capensis*	SUCRE: El Morro de Puerto Santo	10 44	63 09
388	*D. capensis*	VENEZUELA	10 54	63 38
389	*D. capensis*	N. ESPARTA: Bella Vista, Porlamar, Isla de Margarita	10 58	63 49
390	*D. capensis*	N. ESPARTA: Playa La Galera, Juan Griego, Isla de Margarita	11 05	63 59
391	*D. capensis*	N. ESPARTA: Punta de Piedras, Isla de Margarita	10 54	64 06
392	*D. capensis*	N. ESPARTA: Laguna de Raya, Isla de Margarita	10 55	64 06
393	*D. capensis*	N. ESPARTA: Laguna de Raya, Isla de Margarita	10 55	64 06
394	*D. capensis*	N. ESPARTA: Isla de Margarita	11 00	64 06
395	*D. capensis*	N. ESPARTA: Isla de Margarita	11 00	64 06
396	*D. capensis*	SUCRE: Golfo de Cariaco	10 30	64 10
397	*D. capensis*	N. ESPARTA: Playa La Yegua, Isla de Margarita	10 58	64 10
398	*D. capensis*	SUCRE: Off Cumaná	10 29	64 11
399	*D. capensis*	N. ESPARTA: Playa El Saco, Ensenada de La Guardia, Isla de Margarita	11 03	64 12
400	*D. capensis*	SUCRE: Playa San Luis, Cumaná	10 27	64 13
401	*D. capensis*	SUCRE: Playa San Luis, Cumaná	10 27	64 13
402	*D. capensis*	Between Puerto La Cruz and Porlamar	10 40	64 20
403	*D. capensis*	Between Mochima and Península de Macanao	10 40	64 20
404	*D. capensis*	SUCRE: W coast of the Sucre state	10 27	64 22
405	*D. capensis*	SUCRE: Parque Nacional Mochima	10 22	64 22
406	*D. capensis*	ANZOATEGUI: Punta Tigrillo	10 22	64 23
407	*D. capensis*	N. ESPARTA: Robledal	11 02	64 24
408	*D. capensis*	ANZOATEGUI: N Isla Caracas	10 25	64 26
409	*D. capensis*	NW Isla Caracas and I. Picuda Grande	10 24	64 28
410	*D. capensis*	ANZOATEGUI: Off Puerto La Cruz	10 13	64 31
411	*D. capensis*	Between Puerto La Cruz and Punta Penas	10 16	64 38
412	*D. capensis*	N. ESPARTA: Beach south Municipio Tubores	10 54	65 05
413	*D. capensis*	MIRANDA: 1 mi. N Cabo Codera	10 35	66 03
414	*D. capensis*	VARGAS: Playa Pescao, Los Caracas	10 38	66 34
415	*F. attenuata*	FALCON: Playa Tutacas	10 48	68 19
416	*P. crassidens*	SUCRE		
417	*P. crassidens*	Agudo 1995b	10 16	64 38

Table 2 (continued)

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
10/1979	1	~500		Gremone 1979c
	2	4		Leatherwood et al. 1982
8/1979	1	30		Notarbartolo di Sciara, text fn 2
1977	2			Prieto 1977
11/1971	4	1	ZMA 15138	van Halewijn & van Bree 1972
4/1990	2			M.E. Capaldo
8/1988	4, 7	1	EBRG 16887	Agudo 1990, Agudo & Romero 1996
8/1993	2	20		R. Varela and J.C. Capelo*
3/1990	1	12		G. Solé*
7/1991	1	25		Jefferson & Lynn 1994
	4	1	MDMBR n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
	4	1	MDMBR n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
	4	1	MDMCU n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
	4	1	MDMCU n/n	I. Agudo**
b. 1868	1			Ernst 1868
b. 1877	1			Ernst 1877
b. 1891	1			Ernst 1891
2/1993	2, 6	13		Romero et al. 1997b
2/1993	4,6	1	MHNLS n/n	A.I. Agudo and A. Romero**
2/1993	4,6	1	MHNLS n/n	A.I. Agudo and A. Romero**
2/1993	4,6	1	MHNLS n/n	A.I. Agudo and A. Romero**
2/1993	4,6	1	MHNLS n/n	A.I. Agudo and A. Romero**
2/1993	4,6	1	MHNLS n/n	A.I. Agudo and A. Romero**
9/1966	4	1	EDM 709	Mitchell 1970
1/1994	4,6	2	MDMBR n/n	Agudo 1995
12/1992	4	1	LBCS w/n	Agudo & Romero 1996
2/1993	5	1	MDMBR n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
5/1994	5	1	MDMBR n/n	Agudo 1995
5/1955	5	3		Garcia et al. 1995, Díaz et al. 1995, Bolaños et al. 1995
b. 1884	1	1		Ernst 1884
b. 1981	1	>1		Cervigón & Velásquez 1981
b. 1977	2, 6	1		Flores 1977
6/1993	5	1	MDMBR n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
3/1990	1	>1		I. Agudo**
6/1993	5	1	MDMBR n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
1/1971	5	1	MDMCU n/n	Romero et al. 1991
5/1977	5	1	MDMCU n/n	Romero et al. 1991
10–11/1977	1	5-1,000		Evans et al. 1979
6/1979	1	>300		Gremone 1979a
1/1979	1,6	~350		Notarbartolo Di Sciara[9]
1989	2	12		Jácome 1989
7/1979	4,6	4	EBRG CD37	Gremone 1979a, Agudo & Romero 1996
10/1971	4,6	1	ZMA 15137	van Halewijn & van Bree 1972
9/1979	1	16x15-200		Gremone 1979b,c
9/1979	1	>1		Gremone 1979b
1977	1	>1		Mondolfi 1981
8/1979	1	820		Agudo 1995b
1960–1961	4	1	MDMBR n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
8/1990	1	~50		I. Agudo*
8/1980	5	1		Agudo 1995
2/1998	1,5	3		Villarroel et al. 1998
	5			Casinos 1986 + Castellanos*
8/1979	1			Mondolfi 1981

continued

Table 2 (continued)

Record	Species	Locality	Lat. °'N	Long. °'W
418	*P. crassidens*	Cayo Bequeve, Arch. Los Roques	11 52	66 55
419	*P. crassidens*	Archipiélago Las Aves	12 00	67 33
420	*P. crassidens*	ANZOATEGUI: SE Cayo Borracha	10 58	68 15
421	*P. crassidens*	FALCON: San Juan de los Cayos	11 12	68 25
422	*O. orca*	SW Isla de Aves	15 30	63 45
423	*O. orca*	40 Nautical miles SW of Isla de Aves	15 11	64 07
424	*O. orca*	SUCRE: N Isla Picúa Pequena and Picúa Grande	10 21	64 30
425	*O. orca*	SE Isla La Blanquilla	11 46	64 30
426	*O. orca*	Isla La Blanquilla	10 50	64 37
427	*O. orca*	NW Isla La Blanquilla	11 58	64 38
428	*O. orca*	E Isla La Orchila	11 15	66 01
429	*O. orca*	Halfway between Arch. Los Roques and La Guaira	11 10	66 45
430	*O. orca*	VARGAS: Off La Guaira	10 40	66 55
431	*O. orca*	FALCON: Playuela, Parque Nacional Morrocoy	10 50	68 14
432	*O. orca*	ZULIA: Isla de San Carlos, Bahia del Tablazo	10 59	71 36
433	*G. macrorhynchus*	VENEZUELAN CARIBBEAN		
434	*G. macrorhynchus*	N. ESPARTA: Isla de Margarita		
435	*G. macrorhynchus*	N. ESPARTA: 20 km from El Guamache	10 53	64 03
436	*G. macrorhynchus*	La Blanquilla	10 55	64 37
437	*G. macrorhynchus*	La Blanquilla	10 55	64 37
438	*G. macrorhynchus*	La Blanquilla	10 55	64 37
439	*G. macrorhynchus*	20 nautical mi. W La Blanquilla	11 46	65 00
440	*Z. cavirostris*	N. ESPARTA: Tubores, Isla de Margarita	10 54	64 05
441	*Z. cavirostris*	Las Tres Playas, S. Coast La Blanquilla	11 48	64 37
442	*Z. cavirostris*	3 nautical miles Playa El Yaque, S. La Blanquilla	11 48	64 38
443	*Z. cavirostris*	ZULIA: Playa Zulia-Mar, N Caimare Chico	11 13	71 52

[1] Record types: 1= sighting; 2 = photograph or videotape; 3 = tagging; 4 = museum specimen; 5 = stranding; 6 = intentional capture; 7 = incidental capture.

[2] The abbreviations for museum collections can be found in Appendix I.

[3] * = personal observation by person cited (affiliations are given in the acknowledgments section). ** = personal observation by one of the authors.

[4] Mitchell, E. D., and V. M. Kozicki. 1974. The sei whale (*Balaenoptera borealis*) in the northwest Atlantic Ocean. IWC/SC/SP74/32, Arctic Biological Station, Fisheries and Marine Service, Department of the Environment, Box 400, Ste. Anne de Bellevue, Province de Quebec, Canada, 48 p., unpubl. manuscr.

[5] Mondolfi, E. 1981. A preliminary report of the marine mammals in Venezuelan waters, Escuela de Biología, Universidad Central de Venezuela, Caracas, Venezuela, 10 p., unpubl. manuscr.

[6] Anduze, P. J. 1954. Orden Cetacea. *In* Mamíferos de Venezuela, insectivora perisodactyla. Bibl. FLASA, Soc. Cienc. Nat. La Salle, Caracas, 412 p., unpubl. manuscr.

"Tonina," a derivative of the Latin word *thunnus* (tuna), was introduced by the Spaniards in Latin America and used for dolphins because, to an untrained observer, they resemble tuna, but "tonina" is no longer used in Spain. It, along with "delfín" (dolphin) and "ballena" (whale), is used for many species and all three words are thus very imprecise. There is also a great deal of regional variation in usage. "Delfín," for example, is used in Venezuelan urban areas to identify species of the genera *Steno*, *Sotalia*, *Delphinus*, *Tursiops*, and *Stenella*. "Tonina," on the other hand, is used for the same species in rural areas. Thus, there is a need for standard nomenclature in vernacular Spanish names of cetaceans to facilitate communication for legislation, trade, and conservation purposes, and as synonyms in popular writing.

We therefore offer our recommendations for the common name for each species. For some species, this is neither difficult nor controversial because we found a single name used universally. Other cases are more complex because names used by fishermen differ from those used by biologists, names vary geographically, the same name is used for several species, and there may be no vernacular name, particularly for rare species. Our recommendations have been guided by the principles adopted by the American Fisheries Society's Committee on Names of Fishes (Robins et al., 1991) and the American Ornithologists' Union's Committee on Classification and Nomenclature (AOU, 1998).

The basis of our recommendations for common names is:

1) Uniqueness and lack of ambiguity, i.e., a single vernacular name for each species and no two species sharing the same Spanish name;

Table 2 (continued)

Date[1]	Record type	No. of individ.	Museum specimen[2]	Reference[3]
3/1993	2,5,6	1		Agudo 1995
6/1883	5	1	USNM 20932	Miller 1921
7/1979	2	40		Notarbartolo Di Sciara[9]
1975–1976	5	1	MCNUCV n/n / EBRG 17028	Castellanos & Casinos 1982, Bolaños Jiménez 1994
10/1988	1	1		I. Agudo**
1989	1	1		G. Sole*
1987	2	1		L. Orive*
1991	3			I. Agudo**
3/1894	1	>1		Logbook of the schooner Golden City
10/1988	1	1		I. Agudo**
1991	3	1		I. Agudo**
1989	1	2		R. Verginelli-Torres*
1989	1	6		P. Blanco*
7-8/1983	5	1		Rodríguez et al. 1993 + M Palacios *
1/1979	4	1	MBLUZ-M-0001	Agudo et al. 1994
	1	1		Ernst 1891
	1	>1		Cervigón & Velásquez 1981
10/1971	5	22	MDMBR n/n	Casinos & Bou 1980; Bolaños Jiménez 1994
	1	>1		Anonymous[10]
1965–1968	1	>1		Mondolfi 1981
1993	5	4	MDMBR n/n	Bolaños Jiménez 1994, Agudo & Romero 1996
6/1990	1	–20		R. Verginelli*
b. 1977	4	1	MEDIMAR	Casinos 1981
7/1993	5	1	MEDIMAR	Agudo 1995
10/1989	1	2		G. Solé*
b. 1991	2,5	1		Agudo et al. 1994

[7] Boher, S., and H. García. 1990. Un varamiento de la Ballena Jorobada *Megaptera novaeangliae* (Borowski, 1781) en la costa continental venezolana (CETACEA, BALAENOPTERIDAE). Informe Técnico PROFAUNA-MARNR, Caracas, 11 p., unpubl. manuscr.

[8] Mondolfi, E., and R. Muller. 1979. Segundo Informe sobre los resultados obtenidos en las inspecciones realizadas en los canos del Golfo de Paria, el Delta del Orinoco, el Bajo Orinoco y el Bajo Apure. Caracas: Fudena, 77 p., unpubl. report.

[9] Notarbartolo di Sciara, G. 1979. Letter to Edgardo Mondolfi, 1 p.

[10] Anonymous. n/d. Los Recursos Pesqueros de la Región Nororiental de Venezuela. Estado de su explotación y posibilidades futuras. Margarita: EDIMAR, Fundación La Salle de Ciencias Naturales, 22 p., unpubl. manuscr.

2) Simplicity;
3) Concordance with systematic classification, i.e., "delfín," "tonina," and their derivatives, only for odontocetes; "ballena" for mysticetes;
4) Retention of truly vernacular names, those widespread and widely used;
5) Including descriptive attributes such as coloration or general shape;
6) Avoiding names intended to honor people (e.g., "delfín de Risso" for *Grampus griseus*) if they lack descriptive value.

Distribution and localities

Global distribution information has been provided for reference purposes only. The records for Venezuelan distribution are compiled by species and geography (Table 2). For those species where the records indicate a recognizable geographic position (such as latitude and longitude and/or locality), a figure with a location map is included. Where we indicate "western," "central," or "eastern" parts or zones, our categories correspond to these locations: "western" is from Zulia through Falcon states, "central" is from Carabobo through Miranda states; and "eastern" is from Anzoategui through Delta Amacuro states (Fig. 1).

In the sections on conservation status and in remarks for each species, Caribbean localities are given in clockwise order beginning with the Bahamas, followed by Cuba, and so on, ending with Belize (Fig. 2).

Habitat and ecology

Information on habitat and ecology is given only when

Figure 1

Map of Venezuela. Main localities cited in the text.

it is potentially relevant to resolve questions of distribution or to discuss conservation issues.

Threats

Threats to each species are assessed by evidence of direct take (whaling, harpooning), incidental take (by-catches in nets), pollution, habitat destruction, fragmentation and other degradation, and of collecting for museums or aquaria.

Conservation status

We summarize in Table 3 the conservation status for each species according to the "Red List" of the IUCN's World Conservation Monitoring Centre (WCMC) and from the list of cetaceans in the appendices of the Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES).[3]

We agree with Diamond (1988) that to list, for conservation purposes, only those species that are threatened

[3] Updates of these compilations may be found at the WCMC Web site: http://www.wcmc.org.uk.

Figure 2

Map of the Caribbean region. Main localities cited in the text.

is a strategic mistake because it may mislead people into believing that others may be safely captured. Such a misconception would apply particularly for Venezuela and other areas where our knowledge of population status of many cetacean species does not permit characterizing them as threatened, but it is extremely unlikely that they are abundant and not endangered (but see Anonymous[4]). Thus, we follow procedures established by Brownell et al. (1989) for cetacean listing conservation specifics by analyzing their status; recommending, where appropriate, that their endangered status be revised in the light of local threats; and summarizing conservation recommendations.

Because of its implications for conservation, we report, when known, the method of capture. The number of individuals recorded as "stranded," "netted," or "harpooned" does not reflect the total number of strandings, accidental netting, or intentional catches for all the species since the method of capture was not recorded for many museum specimens. Some records labeled as "strandings" in the literature are for animals previously caught or injured by people (such as a collision with a ship), then later found stranded. In these cases, when known, we have used the event leading to stranding (Table 2).

[4] Anonymous. 1977. H/SWRI Technical Report 77/104. December 1977. Biological study of the Venezuelan jetfoil route from Puerto La Cruz to Porlamar: Final report. Boeing Aerospace Company. Purchase Contract U-963361-9120. Submitted by Hubbs-Sea World Research Institute, 1700 South Shore Rd., San Diego, California 92109 (714-223-2693), 12 p.

Table 3

Summary of the international conservation status and local threats for Venezuelan cetaceans.

Species	WCMC[1]	CITES[2]	Local threats
B. borealis	Endangered/A1abd	I	None known
B. edeni	Data deficient/-	I	None known
B. physalus	Endangered/A1abd	I	None known
M. novaeangliae	Vulnerable/A1ad	I	Hunted until recently
P. macrocephalus	Vulnerable/A1bd	I	Hunting occurred. None now
I. geoffrensis	Vulnerable/A1cd	II	Hunting, live-collecting, habitat disruption, pollution
S. bredanensis	Data deficient/-	II	None known
S. fluviatilis	Data deficient/-	I	Habitat fragmentation, pollution, hunting
G. griseus	Data deficient/-	II	None known
T. truncatus	Data deficient/-	II	Hunting
S. frontalis	Data deficient/-	II	Gill nets
S. attenuata	Lower risk: conservation dependant/-	II	Fisheries
S. longirostris	Lower risk: conservation dependant/-	II	Gill nets, firearms
S. clymene	Data deficient/-	II	Gill nets
S. coeruleoalba	Lower risk: conservation dependant/-	II	None known
D. capensis		II[3]	Hunting
F. attenuata	Data deficient/-	II	None known
P. crassidens		II	None known
O. orca	Lower risk: conservation dependant/-	II	None known
G. macrorhynchus	Lower risk: conservation dependant/-	II	None known
Z. cavirostris	Data deficient/-	II	None known. Reports of possible effects from military exercises

[1] From the "Red List" of the IUCN's World Conservation Monitoring Centre.

[2] From the Convention on International Trade and Endangered Species of Wild Fauna and Flora.

[3] Originally "*Delphinus delphis*."

Remarks

In this section we summarize the Caribbean distribution, interpret the records and, when appropriate, offer historical notes.

Bibliographic treatment

When there are multiple literature citations in the text, they are in chronological order. Citations for authors of taxa are not included but can be found in Allen (1881),.Simpson (1945), Hershkovitz (1966), and Truitt (1974).

Quantitative analysis

All procedures were performed using Systat (version 7.01) for Windows™ (Wilkinson and Hill, 1994).

Results

Systematic list

Order CETACEA Brisson, 1762
Suborder MYSTICETI Flower, 1864
Family BALAENOPTERIDAE Gray, 1864
Subfamily BALAENOPTERINAE (Gray, 1864) Brandt, 1872
Genus *Balaenoptera* Lacépède, 1804
***Balaenoptera borealis* Lesson, 1828, sei whale**

Spanish common names Ballena, ballena boba, ballena negra, ballena sardinera, ballena sei, ballenato, rorcual, rorcual boreal, rorcual del norte, rorcual negro, rorcual norteño.

Proposed Spanish common name Casinos (1986) called it "Rorqual norteño o de Rudolphi." Vidal (1990) used "ballena sei." We recommend "rorqual sei" to help distinguish members of this genus from other mysticetes.

Global distribution Cosmopolitan and pelagic. Mostly temperate and oceanic (Gambell, 1985a).

Occurrence in Venezuela Eastern Venezuela (Table 2; Fig. 3).

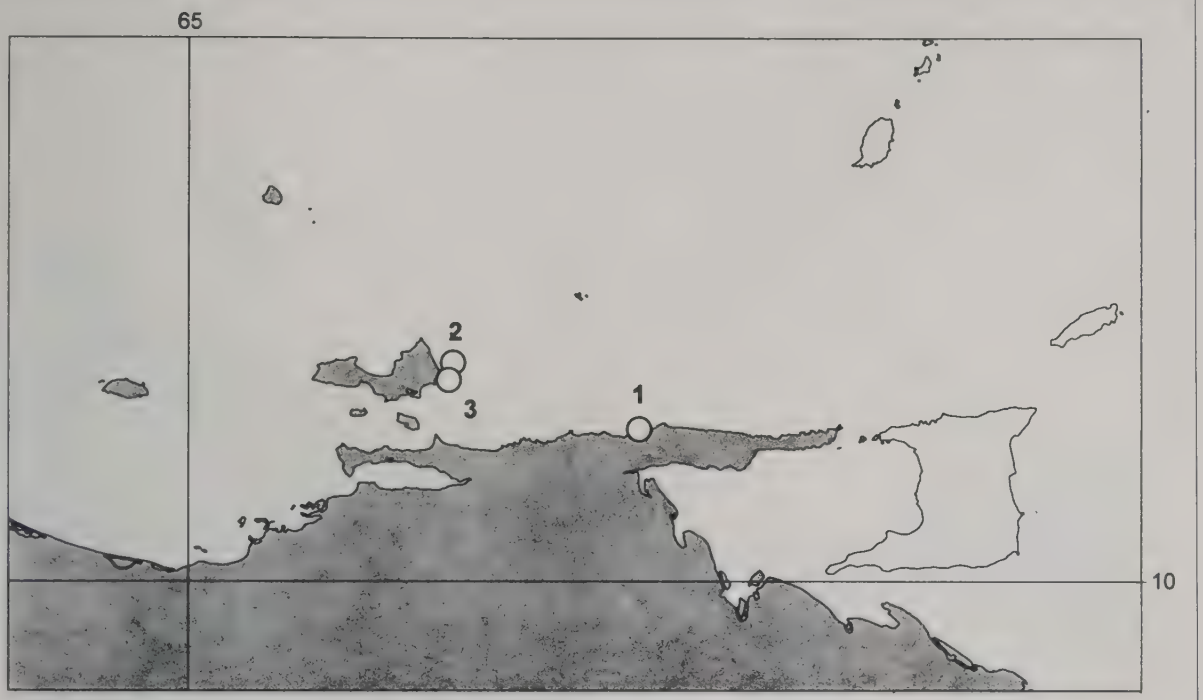

Figure 3

Balaenoptera borealis occurrences by record number from Table 2.

Threats None known for this species in Venezuela.

Conservation status and recommendations This species is classified as "Endangered" by the WCMC and listed in Appendix I of CITES (1992). There are only three records for Venezuela, all sightings or taggings from locales where mysticetes are most abundant (Table 2). There are few records for this species in the Caribbean, where it is considered rare (Notarbartolo di Sciara, 1983). Leatherwood and Reeves (1983) have even questioned its presence in the Caribbean Sea. There are pelagic ("at sea") records (Slijper et al., 1964; Erdman, 1970; Erdman et al., 1973) as well as coastal ones from Cuba (Varona, 1965, 1974), the Dominican Republic (Mead, 1977; Bonnelly de Calventi, 1994), and the British Virgin Islands (Erdman, 1970). There are only four reliable records for the Gulf of Mexico (Jefferson and Schiro, 1997). Of all these Caribbean records, only Mead's (1977) can be considered fully reliable.

These records reflect the worldwide distribution of this species and, thus, it must be considered as an occasional visitor rather than a resident of Venezuelan waters. Sei whales were heavily hunted in the past and although there are no precise figures, the general consensus is that the global population is low. Venezuelan coasts are heavily influenced by both South and North Equatorial currents. Mitchell and Chapman (1977) believe that the *B. borealis* they observed in northern Venezuela were migrating whales from southern hemisphere stock during the austral winter. The dates of observations in Venezuela (February, July, and September) do not allow us to conclude whether the records are better interpreted as animals from the northern or southern stocks.

Systematic long-term studies are necessary to ascertain the basic natural history and population size and dynamics of all the cetaceans, but they are especially needed for species like this, whose presence seems occasional at best.

Remarks This species is easily confused with *B. edeni*, thus yielding fewer confirmed records than might otherwise be the case.

Balaenoptera edeni Anderson, 1878, Bryde's whale

Spanish common names Ballena, ballena arenquera, ballena caribeña, ballena de arenque, ballena de Bryde, ballena tricrestada, ballena tropical, ballenato, ballenato rorcual, rorcual, rorcual caribeño, rorcual de Bryde, rorcual tropical.

Proposed Spanish common name Casinos (1986) used the names "rorcual tropical o de Bryde." Vidal

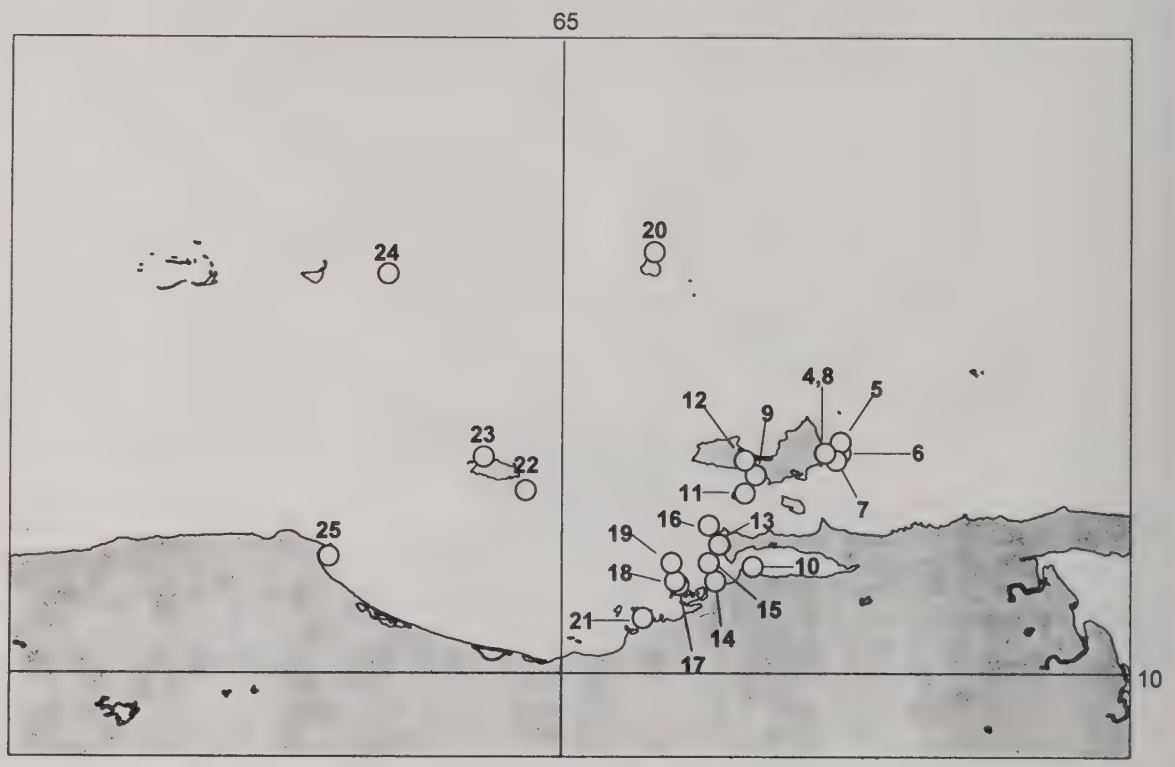

Figure 4

Balaenoptera edeni occurrences by record number from Table 2.

(1990) used "ballena de Bryde." We therefore propose "rorcual de Bryde" while recognizing it violates our principle by using an honorific rather than a descriptive name. Our justification for this departure is that "rorcual" is widely used for the genus *Balaenoptera* and "Bryde" is an almost universal denomination. No other common name has ever been widely used except those so general that they may be confused with names of other balaenopterids.

Global distribution Tropical and subtropical waters of the world. Pelagic and coastal. Long migrations are not typical (Cummings, 1985).

Occurrence in Venezuela This is by far the most common mysticete in Venezuela. Virtually all the records, however, are only from the eastern part of the country (Table 2; Fig. 4).

Unconfirmed records Ernst (1886) claims to have seen a "*B. rostrata*" between the islands of La Tortuga and Margarita in 1873, but we suggest it was probably *B. edeni*.

Threats None known in Venezuela.

Conservation status and recommendations It is classified as "Data Deficient" by the WCMC and is in Appendix I of CITES. Because this species seems not to have been heavily hunted anywhere, and certainly not in the North Atlantic and the Caribbean, the population may be stable. Of the 23 records for Venezuela, none is associated with captures of any type. This species is not known for long migrations (Cummings, 1985) and records are concentrated between Puerto La Cruz, the Cumaná area, and Margarita Island. Combined with the relatively uniform distribution of records throughout the year (Table 2), this may indicate that there is a resident population in the area.

The species has been recorded for St. Croix (Mignucci-Giannoni, 1996), the Dominican Republic (Bonnelly de Calventi, 1994), Grenada (Soot-Ryen, 1961), Curaçao (Soot-Ryen, 1961; Debrot, 1998; Debrot et al., 1998), Aruba (Agudo and Ponson, 1996), and the Colombian Caribbean (Cuervo Díaz et al., 1986; Prieto Rodríguez, 1988; Vidal, 1990). It is not uncommon in the Gulf of Mexico (Mead, 1977; Jefferson and Schiro, 1997).

Evans et al. (1979) note that local fishermen associate the presence of these whales with the abundance of bait fish, particularly sardines (*Sardinella anchovia*),

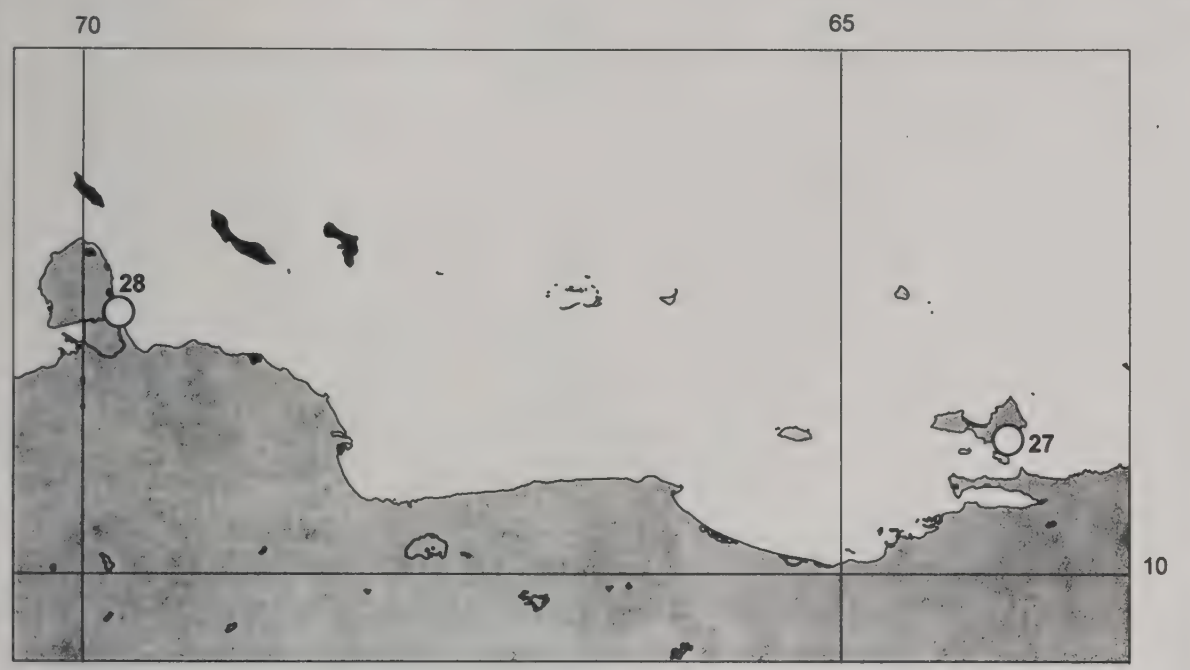

Figure 5

Balaenoptera physalus occurrences by record number from Table 2.

and they suggest that many of the whales appear in the late spring and early summer, feed in the area for several months, and then depart to equatorial waters in the winter with a few remaining year-round. Group size varies with season; 55% are seen as single, 27% as pairs, and 18% in groups of three or more (Hoyt, 1984). We found that 78% of the sightings were of a single individual. Groups of up to eight individuals have been seen feeding on different species of fish, e.g., the Atlantic saury (billfish) (*Scomberesox saurus*) (Notarbartolo di Sciara, 1983; Anonymous[4]).

Remarks Our record #8 (Table 2) corresponds to a Bryde's whale being killed by a swordfish (*Xiphias gladius*). Cetacean mortality from swordfish is rare, but not unknown (Jonsgård, 1959).

Balaenoptera physalus (Linnaeus, 1758), fin whale

Spanish common names Ballena, ballena boba, ballena de aleta, ballenato, rorcual, rorcual común.

Proposed Spanish common name Vidal (1990) called it "ballena de aleta," a direct translation from English. Casinos (1986) employs "rorcual común" and we concur with that choice, a name consistent with those we propose for other members of this genus.

Global distribution Cosmopolitan, mostly pelagic. Wintering areas extend from the ice edge southwards to the Caribbean and the Gulf of Mexico. It exhibits seasonal migrations (Gambell, 1985b).

Occurrence in Venezuela One record for the western part and two for the eastern part (Table 2; Fig. 5).

Threats None known in Venezuela.

Conservation status and recommendations This species is classified as "Endangered" by the WCMC and listed in Appendix I of CITES. The few records for the Caribbean are "at sea" (Slijper et al., 1964) and for Colombia (Prieto Rodríguez, 1988; Vidal, 1990) and the Gulf of Mexico (Jefferson and Schiro, 1997). It is not clear whether sightings in the area correspond to part of their normal migratory patterns or to stray individuals, but they must in any case be considered very rare in the Caribbean.

Subfamily MEGAPTERINAE Gray, 1866

Genus *Megaptera* Gray, 1846

Megaptera novaeangliae (Borowski, 1781), humpback whale

Spanish common names Ballena cantora, ballena corcovada, ballena de aleta grande, ballena jorobada, ballenato, guabarte, jorobada, rorcual jorobado, yubarta.

Proposed Spanish common name Although "yubarta" is occasionally used (Casinos, 1986), "ballena jorobada" is by far the most widely used common name in Spanish, particularly in Latin America.

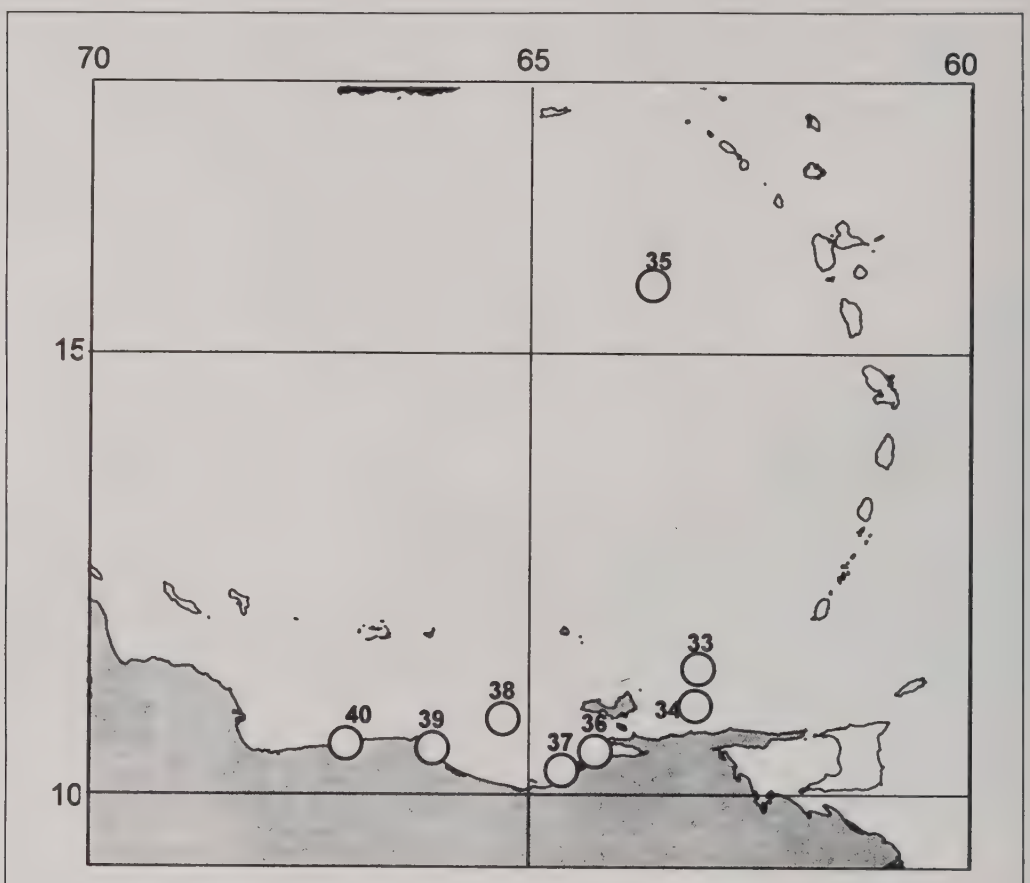

Figure 6

Megaptera novaeangliae occurrences by record number from Table 2.

Global distribution Cosmopolitan. Mostly coastal with strong seasonal migrations (Winn and Reichley, 1985).

Occurrence in Venezuela Four records report only "Venezuela," but all the others note locales in the central and eastern zones, two in the central coasts, five in the eastern part of the country, and one for Isla de Aves (a Venezuelan island in the northeastern Caribbean) (Table 2; Fig. 6).

Threats This species was hunted in and near Venezuelan waters as early as the the 19th century, as evidenced by records for 1853 and 1871. Logbooks from whaling ships show that some humpback whales were captured in the eastern waters of Venezuela, particularly between January and March (Townsend, 1935). In early 1960 there was a stranding at Carenero-Buche of an individual with three embedded harpoons of Japanese origin (Romero and Agudo, 1993). In 1977 another was found that had been struck by hydrofoils elsewhere, perhaps the cause of its death (Hudnall, 1978).

Conservation status and recommendations It is classified as "Vulnerable" by the WCMC and listed in Appendix I of CITES. There are about 10,000 individuals in the northern North Atlantic, its highest population level anywhere (Smith et al., 1999). It is reported as formerly abundant between Trinidad and northeastern Venezuela during winter (Mitchell and Reeves, 1983). It has coastal feeding and breeding grounds in the eastern Caribbean (Winn et al., 1975; Winn and Reichley, 1985) and has also been recorded for Cuba (Cuní, 1918; Varona, 1974), the Dominican Republic (Bonnelly de Calventi, 1994), Puerto Rico (summarized in Mignucci-Giannoni, 1996), Barbuda (Mignucci-Giannoni, 1996), Antigua (Mignucci-Giannoni, 1996), St. Vincent (Caldwell et al., 1971a), Bequia (Lindeman, 1880; Clark, 1887; Brown, 1945 [cited in Caldwell et al.1971a]; Fenger, 1958; Mitchell, 1965; Adams, 1971; Caldwell et al., 1971a; Price, 1985), between Banaire and Klein Bonaire and in Bonaire (Debrot et al., 1998), Curaçao (Debrot, 1998), and Colom-

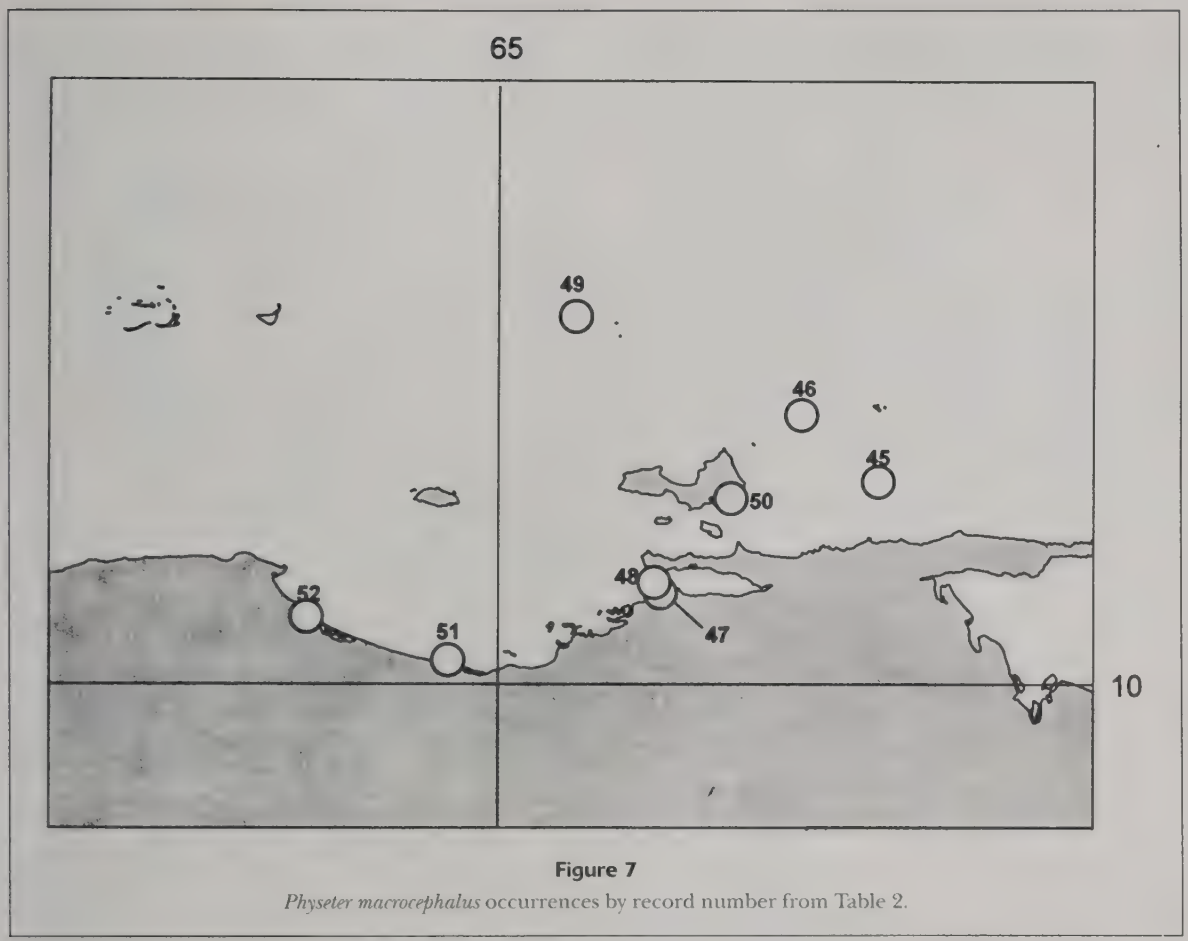

Figure 7

Physeter macrocephalus occurrences by record number from Table 2.

bia (Cuervo Díaz et al., 1986; Vidal, 1990). There are nine confirmed records for the Gulf of Mexico (Jefferson and Schiro, 1997). The Venezuelan records are widely dispersed in time, not allowing us to infer its seasonal movements in these waters.

Suborder ODONTOCETI Flower, 1867
Superfamily PHYSETEROIDEA (Gray, 1821) Gill, 1872
Family PHYSETERIDAE Gray, 1821
Subfamily PHYSETERINAE (Gray, 1821) Flower, 1867
Genus *Physeter* Linnaeus, 1758
***Physeter macrocephalus* Linnaeus, 1758, sperm whale**

Taxonomic status There is still some controversy on whether *P. macrocephalus* has precedence over *P. catodon* (Husson and Holthuis, 1974; Schevill, 1986; Holthuis, 1987). We concur with Rice's (1989) interpretation of the International Code of Zoological Nomenclature that *P. macrocephalus* should be the correct name.

Spanish common names Ballena de esperma, ballena de espuma, ballena dentada gigante, *ballenato, *cachalote, *chacalote, *fiseter, guapo.

Proposed Spanish name "Cachalote" since it is, by far, the most commonly used name in Spanish.

Global distribution Cosmopolitan. Mostly mesopelagic and deep seas (Rice, 1989).

Occurrence in Venezuela Twelve records, mostly from eastern Venezuela (Table 2; Fig. 7).

Unconfirmed record Ernst (1886) may have seen a *P. macrocephalus* off the coast of Carúpano (Sucre State).

Threats Although harpooning has occurred recently in the Lesser Antilles (Rathjen and Sullivan, 1970), no threats are presently known in Venezuela. It has been hunted in Venezuelan waters (Romero et al., 1997b) and there is a report of a hunting ground in the Los Frailes-La Sola-Los Testigos area as late as 1967 (Vila, 1967).

Conservation status and recommendations It is classified as "Vulnerable" by the WCMC and listed in Appendix I of CITES. It is found over deep oceanic

waters and along continental slopes, and is the second most common and widely distributed large cetacean in the world (after *O. orca*) (Rice, 1989). Although its distribution is worldwide, some populations may be isolated. It is fairly common in the deeper basins of the Caribbean. It has also been reported for Cuba (de la Torre, 1907; Cuní, 1918; Scaramuzza, 1943; Aguayo, 1954; Varona, 1974; Jefferson and Lynn, 1994), Haiti (Gosse, 1851), the Dominican Republic (Erdman et al., 1973; Bonnelly de Calventi, 1994; Gricks, 1994), Puerto Rico and the Virgin Islands (Erdman, 1970; Erdman et al., 1973; Mignucci-Giannoni, 1996), Anguilla (Gricks, 1994), St. Barthelemy (Gricks, 1994), Barbuda (Mignucci-Giannoni, 1996), Antigua (Mignucci-Giannoni, 1996), Montserrat (Gricks, 1994), Dominica (Watkins et al., 1993; Gricks, 1994), Martinique (Watkins and Moore, 1982), St. Lucia (Watkins and Moore, 1982), St. Vincent (Townsend, 1935; Rathjen and Sullivan, 1970; Wood et al., 1970; Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Watkins and Moore, 1982), Bequia (Brown, 1945 [cited in Caldwell et al., 1971a]; Fenger, 1958; Watkins and Moore, 1982), Barbados (Townsend, 1935; Brown, 1942 [cited in Caldwell et al., 1971a]), Curaçao (van Bree, 1975; Debrot et al., 1998), Colombia-Panama (Palacios et al., 1996), and the Gulf of Mexico (Mullin et al., 1994c; Jefferson and Schiro, 1997).

In the first published report of a cetacean stranding in Venezuela, Codazzi (1841) noted that sometimes sperm whales could be seen in large groups. It may have been hunted as early as the 18th century off Venezuelan coasts (Townsend, 1935). Despite being oceanic and having been heavily hunted until recently, its presence in Venezuela is common, but largely limited to the deep waters north of the continental shelf. Although our records report its presence only in summer, it's probable that at least males have extensive north-south seasonal movements.

Superfamily PLATANISTOIDEA (Gray, 1863) Simpson, 1945
Family INIIDAE Flower, 1867
Genus *Inia* d'Orbigny, 1834
Inia geoffrensis (de Blainville, 1817), boto

Taxonomic status The specific and infraspecific taxonomic nomenclature of *Inia* has yet to be fully resolved, with discussion continuing whether all *Inia* populations are a single species. Some authors divide *Inia* into three subspecies depending on geographical distribution: *I. g. geoffrensis* (de Blainville, 1817) for the Amazon, except the upper Madeira river drainage, *I. g. humboldtiana* (Pilleri and Gihr, 1977) for the Orinoco drainage basin, and *I. g. boliviensis* (d'Orbigny, 1834) for the Beni basin (the Madeira River drainage above the Teotonio Rapids) (see Best and da Silva, 1989b). According to Pilleri and Gihr (1977, 1980), the Beni population is a different species, *I. boliviensis* (d'Orbigny, 1834) (but see Casinos and Ocaña, 1979). There is some controversy on whether *I. boliviensis* is a synonym of *I. geoffrensis* (van Bree and Robineau, 1973; Mead and Brownell, 1993). We view it as a single species with three subspecies or differentiated populations (Best and da Silva, 1989a,b; Anderson, 1997).

If Pilleri and Pilleri (1982) are correct in their suggestion that *I. geoffrensis* of the upper Orinoco and Brazo Casiquiare is *I. geoffrensis geoffrensis*, then this subspecies is also in Venezuela.

Spanish common names Boto, *bufeo, bufeo colorado, *bufete, buto, delfín amazónico, delfín de agua dulce, delfín de río, *delfín llanero, delfín rosado, delfín rosado del Amazonas, fansa, tonina, tonina de agua dulce, *tonina de río, *tonina del Orinoco, toñina.

Indigenous names in Venezuela Katsali (in the Macusi language), muna (in the Cabre and Maypure languages), orinucna and orinocona (in the Tamanaca language), yufa (in the Guama language), urinugna (in Guayana and Tamanaca languages).

Proposed Spanish common name Each country where this species is present has several local vernacular names. Some of those names are the same for the partially sympatric *Sotalia fluviatilis*. The name "delfín" is too generic; "boto" is peculiar to Brazil, and "bufeo" and "bufeo colorado" to Colombia; "bufeo" has been widely used for *S. fluviatilis*. Of all the names used so far, the most distinct would be "tonina de río" because tonina was the first name given by the Spaniards (Romero et al., 1997a) and is still very widely used, and we differentiate it from *Sotalia*, which can be found in marine environments as well.

Global distribution Orinoco, Amazon, and Beni watersheds. In all freshwater habitat types in the Orinoco and the Amazon basins, except estuaries, extreme rapids, and waterfalls (Best and da Silva, 1989a).

Occurrence in Venezuela Widely distributed in the Orinoco watershed, including the Casiquiare and the Río Negro. There is no geographical or ecological barrier between the populations of the Orinoco and the Amazon drainages (Wallace, 1889; Handley, 1976; Pilleri and Pilleri, 1982; Pilleri et al., 1982; Best and da Silva, 1989a,b; Meade and Koehnken, 1991; Romero et al., 1997a) (Table 2; Fig. 8).

Habitat and ecology It is a generalist fish feeder seen most frequently at the junctions of rivers and tributaries (Klinowska, 1991; Meade and Koehnken, 1991; McGuire and Winemiller, 1998), consistent with observations in the Amazon basin (Magnusson et al., 1980). They are most abundant in whitewater rivers draining the Venezuelan llanos (savannas), at intermediate levels in clearwater rivers draining the upland shield areas, and least abundant in blackwater-clearwater rivers

Figure 8

Inia geoffrensis occurrences by record number from Table 2.

draining lowland shield areas (Meade and Koehnken, 1991). It was reported that a lower jaw of *I. geoffrensis* was found on Margarita Island (Trebbau and van Bree, 1974). It probably represents the remains of an individual washed out from the Orinoco delta or it may have been left behind by a Margarita Island fisherman's by-catch taken from the Orinoco delta.

According to Meade and Koehnken (1991), it can be found in the Orinoco drainage either as solitary individuals (32% of the observations) or in groups of two to six. McGuire and Winemiller (1998) found a mean number of dolphins per sighting of two, with a range between one and eight animals. Combining this information with records from the Apure River (Schnapp and Howrovd, 1990, 1992), 42% of observations were of solitary individuals. In the Amazon, however, most sightings (81%) were of solitary individuals (Magnusson et al., 1980).

Conservation status It is classified as "Vulnerable" by the WCMC and listed in Appendix II of CITES.

Threats As described below, the species has been threatened by captures, habitat destruction, deforestation, pollution, and live-captures.

Captures The Tamanaco Indians, the original inhabitants of the Orinoco watershed, captured it for human consumption (Gilij, 1782) and it has been widely used by Venezuelan fishermen since the 19th Century or earlier. Botos were also hunted by the Mapoyos (Chaffanjon, 1889) and Ernst (1884) mentions tympanic bullae of this species—bones measuring only ca. 4 cm × 6 cm × 8 cm (Kasuya, 1973)—as being among the "commercial products" at the 1883 Venezuelan National Exposition. Harpooning may occur, but seems to be rare. Harpoons employed in hunting dolphins on the eastern Venezuelan coast are manufactured in Puerto Ayacucho on the upper Orinoco River (Romero and Agudo, 1993), so the weaponry is available inland as well. Trebbau (1975) mentions the use of harpoons and nets in capturing *Inia*. He says that "Apure fishermen do not have many superstitions regarding dolphins (although the blubber is said to be an excellent remedy for asthma), and it was consequently easy to hire fishermen for aid [*sic*] in capture." We have also heard of reports of this species being captured for local consumption in Portuguesa State (Romero et al., 1997b). These dolphins are occasionally captured in nets as by-catches and usually released, but sometimes they become entangled and die.

Habitat disruption The Guárico River Dam is responsible for eliminating its upstream population (Pilleri, 1979). Upstream effects by dams may be due to the resulting isolation of freshwater dolphin populations, thus increasing many risks associated with fragmenting threatened populations and their habitats (e.g., Green and Minkowski, 1977), including reduction in genetic variability (Klinowska, 1991). The Guri Dam on the Caroní River, a tributary of the Orinoco, has caused apparent depletion of this species in the lower reaches (Perrin and Brownell, 1989). Such downstream effects may be a product of reduction in the freshwater flow coming out of dams. This creates increases in salinity, causing declines in migratory fish, a critical food supply for the *Inia* (Reeves and Leatherwood, 1994; for ecological imbalances at Guri, see Weibezahn, 1994). More river modifications are planned in the near future for the Orinoco, Apure, and Meta rivers (Reeves and Leatherwood, 1994).

Deforestation Soil erosion consequent to deforestation increases turbidity and may produce silting, thus directly and indirectly altering the floral and faunal composition of rivers. In addition, some fish that constitute the main diet of river dolphins rely on fallen seeds and fruits from trees whose bases are inundated when the river floods every year (Vidal, 1993). If these trees perish or are removed, an important link in the food chain is destroyed. The rate of deforestation in Venezuela is high (Romero, 1992a).

Pollution Pesticides have been found in the milk of Orinoco River dolphins (Gewalt, 1978). High levels of mercury have been found in fish in the Orinoco basin as a consequence of gold-mining activities (Nico and Taphorn, 1994). During March and April of 1995, the Venezuelan press reported the death of numerous fish and *Inia* at Caño Cunavichito of the Apure watershed (Rizk, 1995). There was speculation that the massive die-off was a consequence of chemical pollution. Water pollution at high levels is widespread in Venezuela (Romero, 1992a).

Live-captures Collections have been made for many aquarium exhibits, e.g., Sea World Aquarium at San Diego, the Shedd Aquarium in Chicago, the Duisburg Zoo in Germany, and the Acuario J. V. Seijas of Valencia, Venezuela (Trebbau, 1975; Ostenrath, 1976; Pilleri et al., 1979; Brownell, 1984; Collet, 1984; Sylvestre, 1985), including the only albino cetacean reported for Venezuela (Gewalt, 1978). In general, they fare poorly in captivity (Caldwell et al., 1989). The only place in Venezuela where this species has been kept for long periods of time is the Acuario J. V. Seijas of Valencia, Carabobo State, which captured 10 individuals between 1975 and 1986 of which eight died (Boede Wantzelius, 1990). Ingestion of foreign objects thrown by visitors is implicated as the cause of death, but an inadequate diet may have contributed to this high mortality rate. Only one birth has been registered there. At least one *Inia* was kept in Moron, Carabobo State, for a limited time (Trebbau, 1975). The report of one in El Pinar Zoo (Pilleri and Gihr, 1977) is erroneous. A request to the U.S. Fish and Wildlife Service to permit importation for the Dallas Aquarium in 1998 was withdrawn due to lack of population studies and serious questions concerning the capture, handling, maintenance, and transport of these dolphins in Venezuela.

Remarks Several naturalists encountered this species in Venezuela before it was described by de Blainville in 1817. In the diaries of an expedition to the Santo Domingo, Apure, and Orinoco rivers in 1647, Fray Jacinto de Carvajal (de Carvajal, 1648) mentions this species, using vernacular names. He notes "tonina" and "bufeo" in groups in the Apure and Orinoco rivers.

Pehr Löfling traveled the Orinoco in 1754 and 1755 and then wrote the (still unpublished) manuscript *Ychthiologia Orinocensis sive Cathalogus Piscium sui in hoc Fluvio piscantur*. An examination of the manuscript (Romero et al., 1997a) reveals a very detailed description of what we know today as *I. geoffrensis*, including two drawings that leave no doubt that he encountered *Inia*.

Shortly after Löfling, a third early naturalist, Filippo Salvatore Gilij, traveled the Orinoco. His description, based on encounters between 1757 and 1766, is as follows: "It is not an amphibian and it is very different from the manatee. The Spaniards call this animal the

Orinoco tonina. But do not mistake the Orinocoan tonina for our tuna by confusing it with the Italian name of *tonno*. I have seen it many times, but never in its entirety. It can be seen only during quiet and calm weather, and then, when happy and partying, the upper half of its body gets out of the water, the other half remaining sunk. It resembles a sea cow. Since I have never seen it closely, I can not give further detailed information. From what I have heard, it is good to eat; its taste is not that different from manatee. Only the guamos, perhaps because manatee is not available, eat its meat" (Gilij, 1780; Paolillo and Romero, 1989).

Alexander von Humboldt is the fourth naturalist who mentions this species for Venezuela, based on his travels in the Orinoco and Apure rivers in 1800. On 28 March, while at San Fernando, he wrote: "It is a very extraordinary phenomenon to see cetacea at such distance from the coast. The Spaniards of the Missions designate them, as they do the porpoises of the ocean, by the name of *toninas*. The Tamanacs call this species *orinucnas*. They are three or four feet long; and bending their back, and pressing with their tail on the inferior strata of the water, they expose to view a part of the back and of the dorsal fin. I did not succeed in obtaining any, though I often engage Indians to shoot at them with their arrows. Father Gilij asserts that the Guamos eat their flesh. Are these cetacea peculiar to the great rivers of South America, like the manati, which, according to Cuvier, is also a fresh water cetaceous animal? Or must we admit that they go up from the sea against the current, as the beluga sometimes does in the rivers of Asia? What would lead me to doubt this last supposition is that we saw toninas above the great cataracts of the Orinoco, in the Rio Atabapo. Did they penetrate into the centre of equinoctial America from the mouth of the Amazon, by communication of that river with the Rio Negro, the Casiquiare, and the Orinoco? They are found here at all seasons, and nothing seems to denote that they make periodical migrations like salmon" (von Humboldt, 1814). Later in his narratives, while traveling along the Upper Orinoco, von Humboldt writes: "In the thickiest [*sic*] part of the forest we were astonished by an extraordinary noise. On beating the bushes, a shoal of toninas (fresh-water dolphins) four feet long, surrounded our boat. These animals had concealed themselves beneath the branches of a *fromager*, or Bombax ceiba. They fled across the forest, throwing out those spouts of compressed air and water which have given them in every language the name of 'blowers.' How singular was this spectacle in an inland spot, three or four hundred leagues from the mouths of the Orinoco and the Amazon! I am aware that the pleronectes (dabs) of the Atlantic go up the Loire as far as Orleans; but I am, nevertheless, of opinion that the dolphins of the Temi, like those of the Ganges, and the skate (raia) of the Orinoco, are of a species essentially different from the dolphins and skates of the ocean" (von Humboldt, 1814).

Hershkovitz (1963) contends that von Humboldt saw *Sotalia fluviatilis* instead of *I. geoffrensis* because "The comparatively small size and notably developed dorsal fins of the dolphins described by von Humboldt are characteristic of the genus *Sotalia*. That von Humboldt may have observed *Inia* as well is probable but not evident from his journal." Hershkovitz may be correct for dolphins observed by von Humboldt in the Manzanares River (see Discussion section), but we disagree with his conclusion regarding the dolphins seen in the Apure and the Orinoco rivers. *Inia*'s dorsal fin (rather a ridge) is not as well developed as *Sotalia*'s, but in both species it is clearly visible every time an animal surfaces. There is no passage in von Humboldt's descriptions of his observations in these rivers that is consistent with Hershkovitz's characterization of "notably developed dorsal fins." Furthermore, von Humboldt's (1814) observations were in the Apure River at San Fernando, i.e., the area with the most records of *Inia*, and where *Sotalia* has never otherwise been recorded by an experienced observer. Thus, we presume that the dolphins seen by von Humboldt at the Apure and Orinoco rivers were *Inia* and not *Sotalia*.

Superfamily DELPHINOIDEA (Gray, 1821) Flower, 1864

Family DELPHINIDAE Gray, 1821

Subfamily STENINAE (Fraser and Purves, 1960) Mead, 1975

Genus *Steno* Gray, 1846

***Steno bredanensis* (G. Cuvier in Lesson, 1828), rough-toothed dolphin**

Spanish common names Delfín bastardo, delfín de dientes ásperos, delfín de dientes rugosos, delfín de hocico estrecho, delfín de pico largo, esteno, tonina.

Proposed Spanish common name Casinos (1986) and Vidal (1990) use the name "delfín de dientes rugosos." We propose keeping that descriptive name.

Global distribution Tropical and warm-temperate seas of the world; mostly pelagic (Miyazaki and Perrin, 1994).

Occurrence in Venezuela Only one in the eastern part of the country (Table 2; Fig. 9).

Threats There are no known threats in Venezuela.

Conservation status and recommendations It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES. As is the case with most oceanic species of delphinoids, the distribution of this deep diver is poorly known. It is uncommon in the Caribbean. It has been recorded for Cuba (True, 1889; León and Aguayo, 1945; Aguayo, 1954; Varona, 1974; Gricks, 1994), Haiti (Bonnelly de Calventi, 1994), Puerto Rico (Mignucci-Giannoni, 1996), Barba-

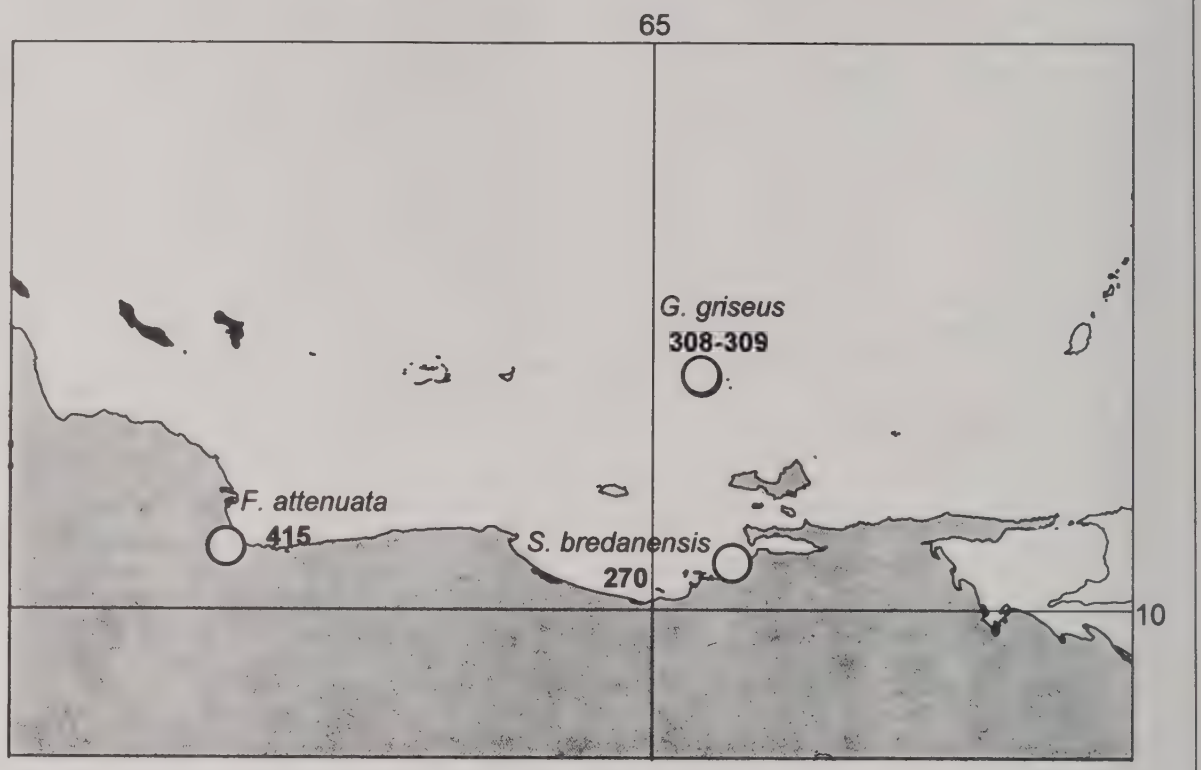

Figure 9

Steno bredanensis, *Grampus griseus*, and *Feresa attenuata* occurrences by record number from Table 2.

dos (Mignucci-Giannoni, 1996), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Gricks, 1994), the Grenadines (Gricks, 1994), and Colombia (Prieto Rodríguez, 1988; Vidal, 1990), with a mass stranding in Belize (Perkins and Miller, 1983). There are 21 verifiable records for the Gulf of Mexico (Mullin et al., 1994c; Jefferson and Schiro, 1997). It is likely to occur in most, if not all, tropical and subtropical waters (Miyazaki and Perrin, 1994). Ernst (1891) was the first to record this species for Venezuela under the then commonly used name of *Steno rostratus*.

Genus *Sotalia* Gray, 1866

Sotalia fluviatilis (Gervais and Deville, 1853), tucuxi

Taxonomic status Originally, under what is today the genus *Sotalia*, up to five different species were described: *S. brasiliensis* van Bénéden, 1875 (coastal waters of eastern South America), *S. fluviatilis* (Gervais, 1853) (in the Amazon River and tributaries and in the Tocantins River), *S. guianensis* (van Bénéden, 1864) (coastal waters of the Guayanas and adjacent areas), *S. pallida* (Gervais, 1855) (in the Amazon River, its tributaries, and Tocantins River), and, *S. tucuxi* (Gray, 1856) (Amazon River, its tributaries, and Tocantins River). There are three proposed arrangements for this genus:

1) The genus should be divided into two species: *S. fluviatilis* (Gervais, 1853) for the river forms (i.e., *S. fluviatilis*, *S. pallida*, and *S. tucuxi*) and *S. guianensis* (van Bénéden, 1864) for the coastal form (i.e., *S. guianensis* and *S. brasiliensis*) (Rice, 1977; Borobia et al., 1991).
2) The genus is monospecific (*S. fluviatilis*) with two subspecies, *S. fluviatilis fluviatilis* (Gervais, 1853) for the river form and *S. fluviatilis guianensis* (van Bénéden, 1864) for the marine coastal one.
3) It is monospecific but with two distinct populations or stocks (river and marine) that are not differentiated at the subspecific level. The last arrangement is most accepted today (for discussion see da Silva and Best, 1994), and we adopt this conservative approach, using *S. fluviatilis* as the name for both marine and river Venezuelan populations.

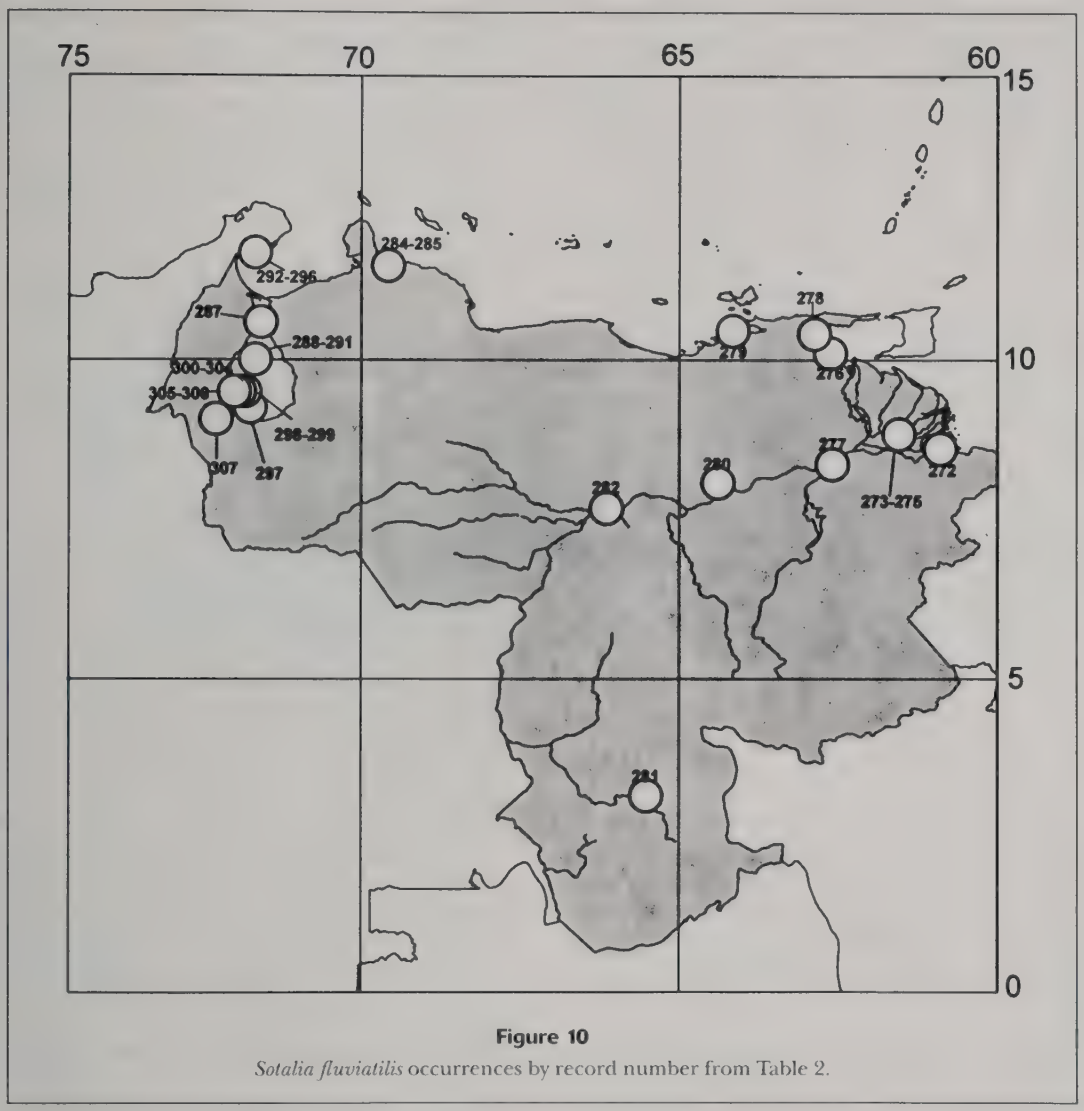

Figure 10

Sotalia fluviatilis occurrences by record number from Table 2.

We agree with van Bree (1974) that, contrary to Hershkovitz (1963), Gervais is the only author and the 1853 description is valid. This species therefore must be cited as *Sotalia fluviatilis* (Gervais, 1853).

Spanish common names Bufeo gris, bufeo loquillo, bufeo negro, *bufete (middle Orinoco), bufo blanco, bufo negro, *bufón (Lake Maracaibo), cuchuska, *delfín blanco (Orinoco delta and nearby creeks), delfín deltáico, delfín de estuario amazónico, delfín de estuario americano, delfín de Guayana, delfín de río, delfín del Amazonas, delfín del Lago de Maracaibo, *tonina de río, tucuxi.

Proposed Spanish name Although this species presents problems similar to those outlined for *I. geoffrensis*, "bufeo" seems to be a sufficiently distinctive and broadly used name to stand as the Spanish common name.

Global distribution Marine form: western Central and South American coasts from Nicaragua (14°35′31″N, 83°14′54″W) (Carr and Bonde, 2000) to the Florianópolis region (27°35′S, 48°34′W), Santa Catarina State, Brazil (da Silva and Best, 1994). The only island record is from Trinidad (van Bree, 1975). Freshwater form: Orinoco and Amazon watersheds (Borobia et al., 1991).

Occurrence in Venezuela The marine form occurs mostly in western Venezuela while the river form occurs mostly in the Orinoco delta (Table 2), making them allopatric in Venezuela (Fig. 10).

Doubtful records BOLIVAR: 130 km from the mouth of the Orinoco River (Hershkovitz, 1963). APURE: San Fernando de Apure and Río Atabapo (Hershkovitz, 1963, 1966, based on his interpretation of von Hum-

boldt's narrations). AMAZONAS: Brazo of Canal del Casiquiare (Borobia, 1990), Baría and Pasimoni rivers, tributaries of the Casiquiare River (Pilleri, 1979). Confluence of the Padamo and Mavaca rivers at the Orinoco, Upper Orinoco, Amazonas State, Caura and upper parts of the Orinoco (Trebbau and van Bree, 1974, no evidence).

Habitat and ecology It is usually found in groups of two to five (Meade and Koehnken, 1991). Turbidity and pH do not seem to affect the distribution of the river form, but rapids do. They prefer deep fresh waters (Meade and Koehnken, 1991) and do not enter flooded areas (da Silva and Best, 1994). The marine form prefers shallow waters (Leatherwood et al., 1976; Borobia et al., 1991; da Silva and Best, 1994).

Threats The records suggest a discontinuous distribution along Venezuelan coasts, with one group in Lake Maracaibo and another in the Paria/Orinoco Delta region. Its distribution along the Orinoco River may not be discontinuous. Given the high level of pollution along the Venezuelan coasts (Romero, 1992a), and the fact that most Venezuelan coasts are deep (Romero, 1990), i.e., not ideal habitat for this species, we believe that *S. fluviatilis* is not only rare, but is possibly endangered. In 1974, van Bree (1974) did not see them in the Orinoco. Northridge (1984) reported that they are taken by gill nets at river mouths. Agudo et al. (1994) reported accidental netting in Lake Maracaibo. This species has been reported from four nominally protected areas in Venezuela, namely Ciénagas del Catatumbo National Park, Mariusas National Park (Delta Amacuro State), Turuépano National Park, and the Alto Orinoco-Casiquiare biosphere reserve. These areas lack active management and law enforcement, however, and therefore may be considered "paper parks" (Romero, 1992a,b).

Conservation status and recommendations It is classified as "Data Deficient" by the WCMC and is in Appendix I of CITES.

Remarks Von Humboldt (1814) may have been the first to note this species for Venezuela, well before its scientific naming by Gervais in 1853. Referring to people who bathe at the Manzanares River, von Humboldt states that "The company were under no apprehensions from the babas, or small crocodiles, which are now extremely scarce, and which approach men without attacking them. These animals are three or four feet long. We never met with them in the Manzanares, but with a great number of dolphins (toninas), which sometimes ascend the river in the night, and frighten the bathers by spouting water" (von Humboldt, 1814). This observation of dolphins swimming upstream, taken together with an earlier section of this passage referring to the area as an estuary, makes it likely that he encountered *Sotalia*.

Subfamily DELPHININAE (Gray, 1821) Flower, 1867

Genus *Grampus* Gray, 1828

Grampus griseus (G. Cuvier, 1812), Risso's dolphin

Spanish common names calderón gris, delfín de Risso, delfín gris, fabo calderón.

Proposed Spanish common name Although Vidal (1990) used "delfín de Risso," we concur with Casinos (1986) in using the most descriptive name of "calderón gris."

Global distribution Pan-globally in tropical and temperate seas, generally over waters deeper than 1,000 m (Klinowska, 1991; Kruse et al., 1999).

Occurrence in Venezuela The only two records are from La Blanquilla island off the central coasts of Venezuela (Table 2; Fig. 9).

Threats It has accidentally been captured with seine nets (Romero et al., 1997b).

Conservation status It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES.

Remarks There are few records from the Caribbean and it does not seem to be a very common cetacean for the area. It has been reported for Cuba (Cuní, 1918; Varona, 1974), Puerto Rico (Mignucci-Giannoni, 1996), St. Croix (Erdman, 1970), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Gricks, 1994), the Grenadines (Gricks, 1994), Aruba (Agudo and Ponson, 1996), and Colombia (Cuervo Díaz et al., 1986; Prieto Rodríguez, 1988; Vidal, 1990). Romero et al. (1991) first recorded this species for Venezuela. It is very common, however, in the Gulf of Mexico (Mullin et al., 1994c; Jefferson and Schiro, 1997). Given its distinctive appearance, we believe that the difference in number of records between the Caribbean and the Gulf represents a real, but puzzling, difference in abundance.

Genus *Tursiops* Gervais, 1855

Tursiops truncatus (Montagu, 1821), bottlenose dolphin

Spanish common names Bufeo, delfín mular, delfín naríz de botella, delfín negro, delfín pico de botella, *guamachín (Sucre and other northeastern States), mular, *negro (Sucre), pez mular, tursión, tonina, tonino (Sucre State).

Proposed Spanish common name Casinos (1986) called it "mular," a common name in Spain but foreign for Latin America. Vidal (1990) called it "tonina." Many Venezuelan fishermen call it "guamachín," a name restricted in usage to the eastern part of Venezuela. We propose the use of "tursión," a name clearly distinct from others.

Global distribution Cosmopolitan except for polar regions; common throughout continental shelves; mostly coastal (Klinowska, 1991; Wells and Scott, 1999).

Occurrence in Venezuela Throughout Venezuelan coasts but particularly in the eastern region (Table 2; Fig. 11).

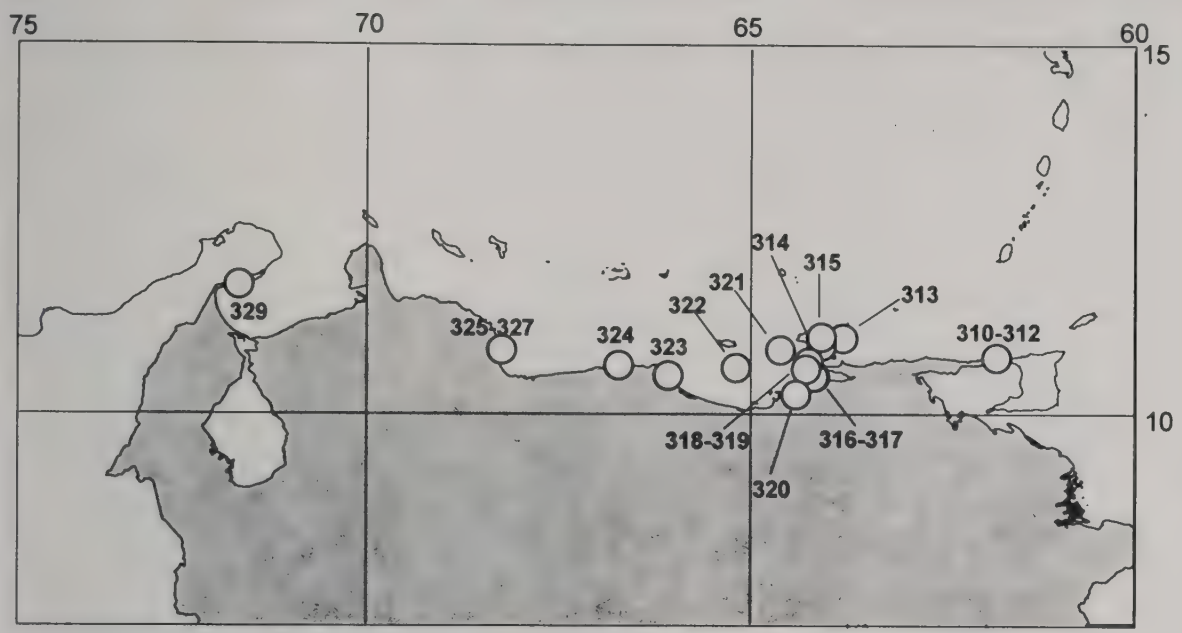

Figure 11

Tursiops truncatus occurrences by record number from Table 2.

Threats This species has been harpooned and incidentally taken in nets along Venezuelan coasts, but to a lesser extent than *D. capensis* (see Romero et al., 1997b for a summary).

Conservation status It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES.

Remarks They can be found scattered in shallow waters in Venezuela (Evans et al., 1979) and it is not unusual to find them elsewhere in the Caribbean, with reports from Cuba (True, 1889; Cuní, 1918; Aguayo, 1954; Varona, 1974), the Dominican Republic (Bonnelly de Calventi, 1994), Puerto Rico (Erdman, 1970; Erdman et al., 1973; Mignucci-Giannoni, 1996), the Virgin Islands (Erdman, 1970), Barbados (Turner, 1912), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975), Trinidad (Bacon, 1975; van Bree, 1975), Curaçao (Debrot, 1998), Bonaire and Curaçao (Debrot et al., 1998), Aruba (Agudo and Ponson, 1996), Colombia (Prieto Rodríguez, 1988; Vidal, 1990), the western Caribbean (Palacios et al., 1996), and Belize (Jefferson and Lynn, 1994). It is very common in the Gulf of Mexico (Mullin et al., 1994c).

Genus *Stenella* Gray, 1866

Stenella frontalis (G. Cuvier, 1829), Atlantic spotted dolphin

Spanish common names Ballenero* (NE of the Paria peninsula), delfín de dientes afilados, delfín manchado, delfín manchado del Atlántico, delfín moteado, delfín moteado común, delfín moteado del Atlántico, delfín moteado endémico, delfín pardo, delfín pintado, estenela moteada, moteado, prodelfín, tonina, tonina moteada, tonino.

Proposed Spanish common name Vidal (1990) uses "delfín manchado del Atlántico" and we propose to maintain that name.

Global distribution Tropical and warm-temperate Atlantic. Mostly coastal (Perrin et al., 1994a).

Occurrence in Venezuela Throughout all the coastal areas and offshore as well (Table 2; Fig. 12).

Threats It is captured incidentally in gill nets in Venezuela and hunted for shark bait and human consumption (Romero et al., 1997b).

Conservation status It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES.

Remarks It is very common in the Caribbean (Perrin et al., 1987), with reports from Haiti (Mignucci-Giannoni, 1996), the Dominican Republic (Bonnelly de Calventi, 1994), Puerto Rico and the U.S. Virgin Islands (Mignucci-Giannoni, 1996), Barbuda and Antigua (Gricks, 1994), Dominica and St. Lucia (Bonnelly de Calventi, 1994), St. Vincent (Caldwell et al., 1971a), Trinidad (Mitchell, 1970), Aruba (Agudo and Ponson, 1996), Colombia (Prieto Rodríguez, 1988; Vidal, 1990), the western Caribbean (Palacios et al., 1996), and Pan-

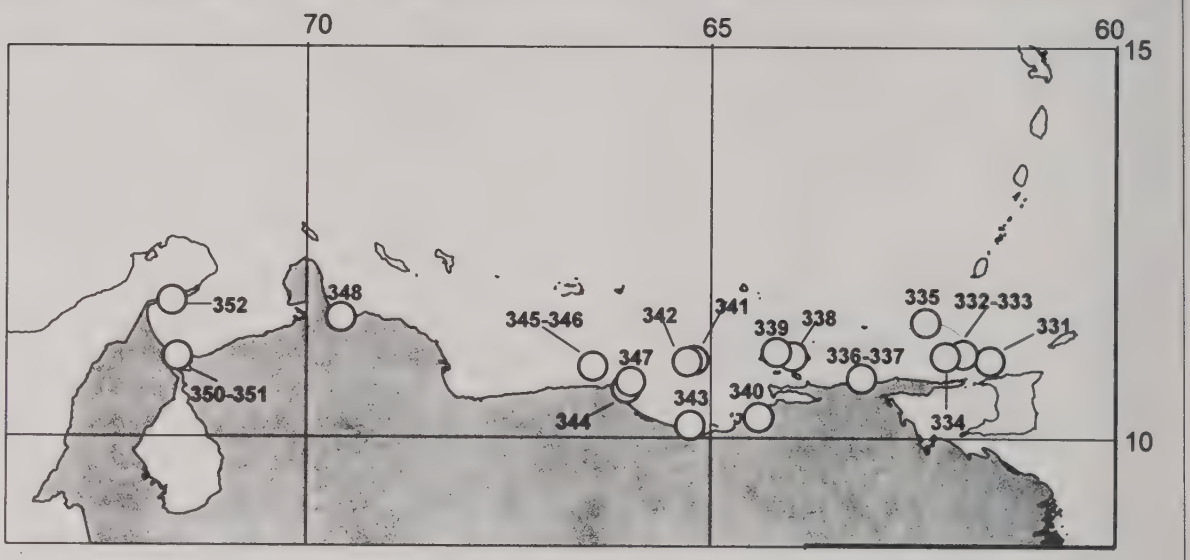

Figure 12

Stenella frontalis occurrences by record number from Table 2.

ama (Caldwell and Caldwell, 1966; Perrin et al., 1994a). It is also common in the Gulf of Mexico (Mills and Rademacher, 1996; Jefferson and Schiro, 1997). In January 1998, a massive stranding (>100) was reported for Isla de la Tortuga (Bolaños and Boher, 1998), the largest stranding event ever reported for Venezuela.

Stenella attenuata (Gray, 1846), pantropical spotted dolphin

Taxonomic status The justification for this name instead of *Steno attenuatus* (Gray, 1846) can be found in Perrin (1990a) and ICZN (1991).

Spanish common names Bufeo manchado, delfín de antifaz, delfín manchado, delfín manchado pantropical, delfín moteado, delfín moteado de antifaz, delfín moteado pantropical, delfín moteado tropical, delfín pintado, estenela moteada pantropical, tonina, tonino pintado.

Proposed Spanish common name We concur with Vidal (1990) in naming it "delfín manchado pantropical."

Global distribution Pantropical and some subtropical waters. Coastal and pelagic (Perrin and Hohn, 1994).

Occurrence in Venezuela The only record is from the eastern region of Venezuela (Table 2).

Threats None known in Venezuela. A severed head was found floating by Curaçao fishermen (12°8′N; 69°0′W, near Venezuelan waters), however, in July 1991. Curaçao fishermen do not customarily kill dolphins (Debrot and Barros, 1994; LeDuc et al., 1997).

Conservation status It is classified as "Lower Risk: Conservation Dependant" by the WCMC and is in Appendix II of CITES.

Remarks In the Atlantic it is primarily an animal of the high seas and oceanic islands. It has also been reported for Dominica (Gricks, 1994), St. Vincent (Perrin et al., 1987; Gricks, 1994), the Grenadines (Gricks, 1994), other Lesser Antilles (Caldwell et al., 1971a), Klein Curaçao and Curaçao (LeDuc et al., 1997; Debrot et al., 1998), several localities of the open Caribbean Sea (Jefferson and Lynn, 1994), the Colombian Caribbean (Cuervo Díaz et al., 1986; Vidal, 1990), and the western Caribbean (Palacios et al., 1996). It seems more common in the Gulf of Mexico than in the Caribbean (Jefferson and Schiro, 1997). The confusing taxonomy of the *Stenella* species-complex, clarified only recently (Perrin et al., 1987), has made it difficult to reliably identify the species and assess its Caribbean distribution.

Stenella longirostris (Gray, 1828), spinner dolphin

Taxonomic status Based on Perrin (1990b) and Perrin and Gilpatrick (1994), the subspecies for Venezuela should be *S. longirostris longirostris* (Gray, 1828).

Spanish common names Delfín churumbelo, delfín girador, delfín hilador, delfín de hocico largo, delfín tornillo, delfín tornillón, delfín volteador, estenela giradora, falso delfín, tonina, volteador.

Proposed Spanish common name Casinos (1986) called this species "delfín de hocico largo," which is not

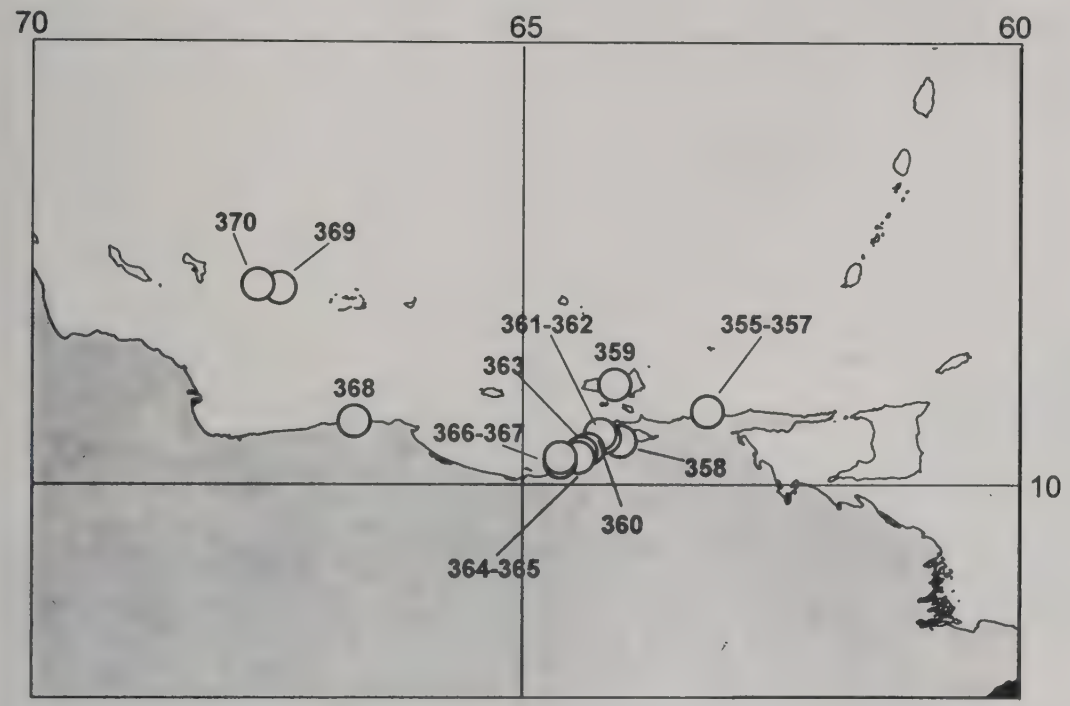

Figure 13

Stenella longirostris occurrences by record number from Table 2.

a very good descriptive reference since many delphinids have long snouts. We concur with Vidal (1990) who used the term "delfín girador" in reference to the spinning behavior of this species.

Global distribution Tropical and subtropical seas of the world. Coastal and pelagic (Perrin and Gilpatrick, 1994), although coastal records are usually from locations with deep waters close to shore.

Occurrence in Venezuela In the eastern and central waters of the country (Table 2; Fig. 13).

Threats It is incidentally captured in gill nets and its meat is occasionally used for shark bait and human consumption (Agudo, 1990). Remains have been found at fishing camps in the Archipiélago Las Aves, Isla de Barlovento (van Halewijn and van Bree, 1972). For a summary of human utilization, see Romero et al. (1997b).

Conservation status It is classified as "Lower Risk" by the WCMC and is in Appendix II of CITES.

Remarks It is fairly common in Venezuela. It has also been reported in the Bahamas (Varona, 1974), Cuba (Perrin et al., 1981), Puerto Rico (Erdman et al., 1973), Dominica (Gricks, 1994), St. Vincent (Caldwell et al., 1971a; Gricks, 1994), the Grenadines (Gricks, 1994), Bonaire (Debrot et al., 1998), Curaçao (Debrot and Barros, 1994; Debrot, 1998; Debrot et al., 1998), and the Caribbean in general (Jefferson and Lynn, 1994; Palacios et al., 1996). There are 17 verified records for the Gulf of Mexico (Jefferson and Schiro, 1997).

It is possible that the dolphins seen by von Humboldt (1814) on November 18, 1799, off the coast of the Península de Araya, an area where spinner dolphins are common, were *S. longirostris*. He described his sighting as follows: "Bands of porpoises followed our bark. Fifteen or sixteen of these animals swam at equal distances from each other. When turning on their backs, they struck the surface of the waters, which seemed like flames issuing from the depth of the oceans. Each band of porpoises, ploughing the surface of the waters, left behind it a track of light, the more striking as the rest of the sea was not phosphorescent." Perrin and Gilpatrick (1994) mentioned a similar description by Antoine-Joseph Pernety in 1769 as possibly the first published reference to the spinner dolphin.

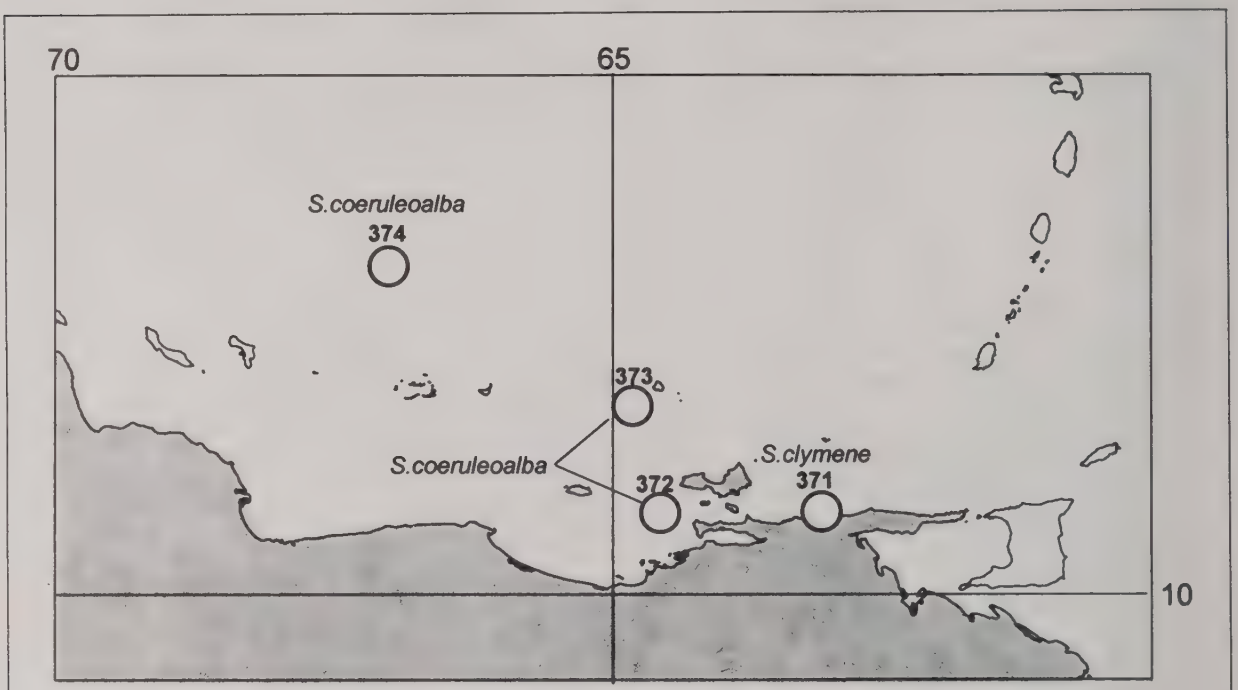

Figure 14

Stenella clymene and *S. coeruleoalba* occurrences by record number from Table 2.

***Stenella clymene* (Gray, 1850), Clymene dolphin**

Spanish common names Delfín celador, delfín clymene, delfín de yelmo, delfín tornillo hocico corto, delfín volteador hocico corto, tonina.

Proposed Spanish common name Since other common names may confuse this species with *Stenella longirostris*, we concur with Casinos (1986) in using the name "delfín de yelmo."

Global distribution Tropical and subtropical Atlantic (Perrin and Mead, 1994). It is primarily pelagic (Jefferson et al., 1993).

Occurrence in Venezuela The only record is for the eastern region of Venezuela (Table 2; Fig. 14).

Threats The only record is for an individual incidentally captured in gill nets in Venezuelan waters and utilized for longline shark bait and human consumption (Agudo, 1990; Romero et al., 1997b).

Conservation status It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES.

Remarks There is a paucity of records for this species worldwide, perhaps because its specific status was not recognized until 1981. The few records for the Caribbean are from St. Vincent and Curaçao (Perrin et al., 1981; Watkins and Moore, 1982) whereas there are 50 reliable records for the Gulf of Mexico (Mullin et al., 1994b; Jefferson and Schiro, 1997).

***Stenella coeruleoalba* (Meyen, 1833), striped dolphin**

Spanish common names Delfín a rayas, delfín azul, delfín blanco, delfín blanco y azul, delfín de betas, delfín listado, delfín rayado, estenela, estenela listada, tonina.

Proposed Spanish common name We concur with Casinos (1986) and Vidal (1990) in naming this species "delfín listado."

Global distribution Tropical and temperate seas of the world. Mostly off the continental shelf (Perrin et al., 1994d).

Occurrence in Venezuela All the records are from islands or pelagic (Table 2; Fig. 14).

Threats None known in Venezuela.

Conservation status It is classified as "Lower Risk" by the WCMC and is in Appendix II of CITES.

Remarks It has been reported from Jamaica (True, 1889; Gricks, 1994), the U.S. Virgin Islands and St. Croix (Mignucci-Giannoni, 1996), St. Vincent (Gricks, 1994), Bonaire and Curaçao (van Bree, 1975; Debrot and Barros, 1994; Debrot et al., 1998), and the Colombian Caribbean (Cuervo Díaz et al., 1986; Vidal, 1990), as well as in several locations of the open Caribbean Sea (Jefferson and Lynn, 1994). It is not uncommon in the Gulf of Mexico with 27 verified records (Jefferson and

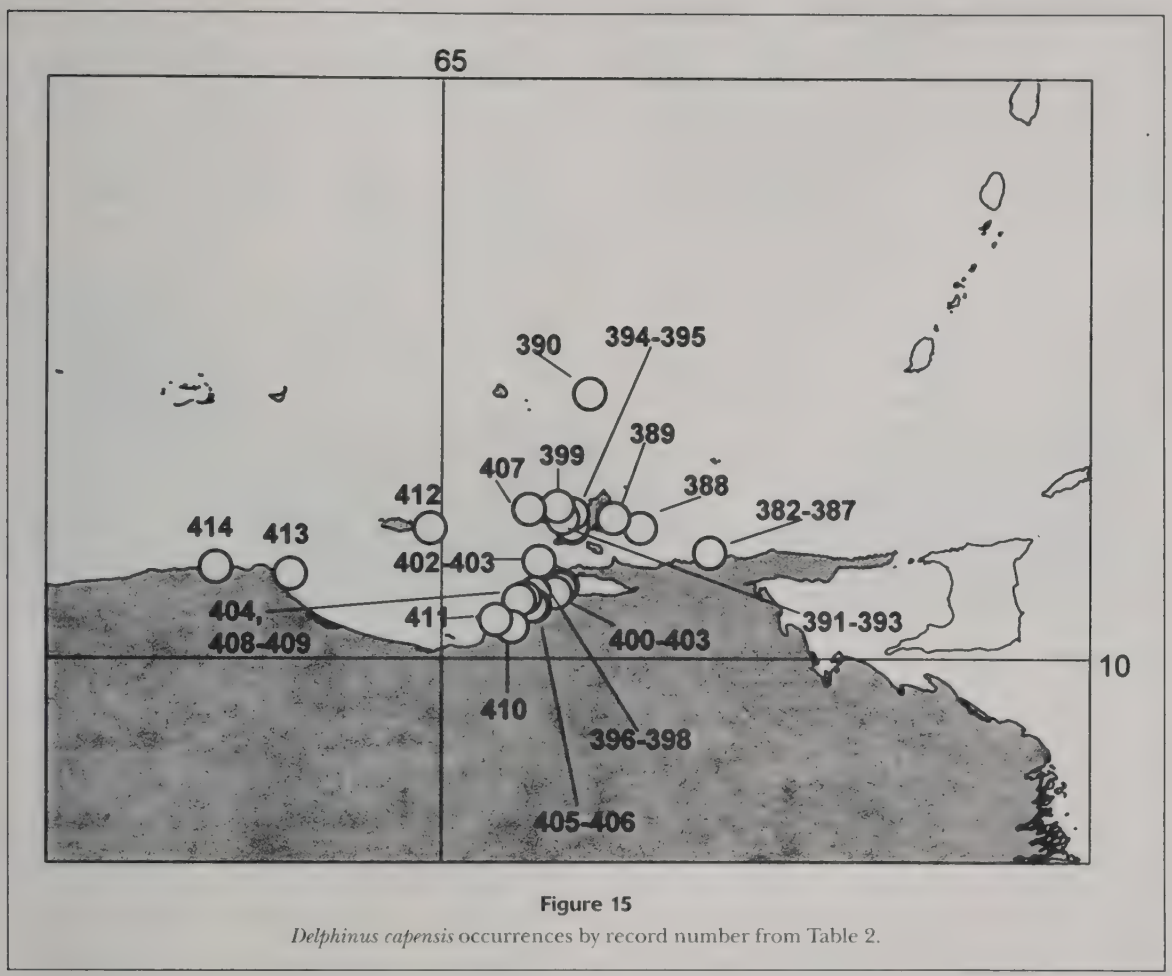

Figure 15

Delphinus capensis occurrences by record number from Table 2.

Schiro, 1997). We would expect more reports from Venezuela than the records indicate.

Genus *Delphinus* Linnaeus, 1758

Delphinus capensis Gray, 1828, long-beaked common dolphin

Spanish common names Delfín común, delfín de mar, *tonina, *tonina de mar (northeastern Venezuela), *tonino.

Proposed Spanish common name "Delfín común" because it is widely used and applies perfectly to the geographical distribution and abundance of this species.

Global distribution Mostly from tropical and temperate oceans of the world. Coastal and pelagic (Evans, 1994).

Occurrence in Venezuela Almost always in the eastern part of the country (Table 2; Fig. 15).

Threats Ernst (1884) mentions artisanal use of this species as a source of oil for lamps and for sealing wooden ships. Van Halewijn and van Bree (1972) reported finding remains of *D. capensis* in a Margarita fishing camp. This is the dolphin usually taken by harpoon in local fisheries of Venezuela (Romero et al., 1997b), where local populations may be threatened by these actions.

Conservation status and recommendations Because its taxonomy has been revised recently (it used to be considered *D. delphis*), there are no status listings. Given the large numbers of these animals taken by Venezuelan fishermen (Romero et al., 1997b), we propose that it should be classified as "Vulnerable" by the WCMC and placed in the Appendix II of CITES.

Remarks Although the overall population distribution remains poorly known because of past confusion with *D. delphis* (Rice, 1998), our examination of specimens leads us to conclude that this species is common along the eastern coasts of Venezuela where it has been seen in groups of up to 1,000 animals (Evans et al., 1979). There are no records, however, for the western part of

the country. This is consistent with its general distributions in the western Atlantic (Rice, 1998). It has been reported from other parts of the Caribbean (Erdman, 1970; Varona, 1974; van Bree, 1975; Watkins and Moore, 1982), but is not known to occur in the Gulf of Mexico (Jefferson and Schiro, 1997). This is the only species of Venezuelan cetacean for which the parasite fauna has been studied (Mignucci-Giannoni et al., 1998a).

Subfamily GLOBICEPHALINAE (Gray, 1866) Gill, 1872

Genus *Feresa*, 1827

Feresa attenuata Gray, 1874, pygmy killer whale

Spanish common names Ballena asesina pigmea, orca pigmea.

Proposed Spanish common name "Orca pigmea," the name most commonly used (Casinos, 1986; Vidal, 1990).

Global distribution This is a pantropical species (Ross and Leatherwood, 1994; Rice, 1998).

Occurrence in Venezuela Only one record for western Venezuela (Table 2; Fig. 9).

Unconfirmed records We received a report of an observer who claimed seeing one animal at sea (Romero et al., 1991), but this is an extremely difficult species to identify by simple visual observation.

Threats None known for Venezuela.

Conservation status and recommendations It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES.

Remarks This is a very uncommon species for the Caribbean, with one record each for Puerto Rico (Rodríguez-López and Mignucci-Giannoni, 1999), the British Virgin Islands (Mignucci-Giannoni, 1996), Dominica (Gricks, 1994), and St. Vincent (Caldwell and Caldwell, 1971a; Caldwell et al., 1971a; Gricks, 1994). Cuervo Díaz et al. (1986) believe it can be found in the Colombian Caribbean. There are 19 reliable records for the Gulf of Mexico (Jefferson and Schiro, 1997).

Genus *Pseudorca* Reinhardt, 1862

Pseudorca crassidens (Owen, 1846), false killer whale

Spanish common names Delfín chato, orca bastarda, orca falsa.

Proposed Spanish common name "Delfín chato" does not seem appropriately descriptive. Casinos (1986) employed the name "orca bastarda" while Vidal (1990) used "orca falsa." We propose the use of "orca falsa" although "orca bastarda" is also unambiguous.

Global distribution In all tropical and temperate oceans of the world. Mostly in deep water and offshore areas (Odell and McClune, 1999).

Occurrence in Venezuela The few records are widespread, although this is the only cetacean in Venezuela for which there are more records from the central coasts than the eastern coasts (Table 2; Fig. 16).

Threats None known in Venezuela even though one was harpooned by a tuna boat at Los Roques archipelago after it became entangled in fishing nets (Romero et al., 1997b).

Conservation status and recommendations It is not classified by the WCMC, but it is in Appendix II of CITES. We propose that it be classified as "Data Deficient" until we learn more about its population status.

Remarks An infrequent species with very few records: Cuba (Cuní, 1918; Aguayo, 1954; Varona, 1974; Gricks, 1994), Puerto Rico (Mignucci-Giannoni, 1996), Dominica (Gricks, 1994; Notarbartolo di Sciara, personal observ.), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Gricks, 1994), the Grenadines (Gricks, 1994), Tobago (Bruyns, 1969), and the western Caribbean (Palacios, 1996). There are 27 reliable records for the Gulf of Mexico (Mullin et al., 1994c; Jefferson and Schiro, 1997). Miller (1921) published the first record for this species in Venezuela.

Genus *Orcinus* Fitzinger, 1860

Orcinus orca (Linnaeus, 1758), killer whale

Spanish common names Ballena asesina, delfín gigante, espadarte, espolarte, moscote, orca.

Proposed Spanish common name "Orca," because of its almost universal use.

Global distribution In all oceans. It is the world's most widely distributed mammal (Dahlheim and Heyning, 1999).

Occurrence in Venezuela Widespread (Table 2; Fig. 17).

Threats None known in Venezuela.

Conservation status It is classified as "Lower Risk: Conservation Dependant" by the WCMC and is in Appendix II of CITES.

Remarks Although very common in temperate waters, it is also common in these tropical waters. There are many records for Venezuela, particularly from the nearby oceanic islands, but relatively few for other parts of the Caribbean. There are also reports for the Bahamas (Varona, 1974; Backus, 1961), Cuba (Cuní, 1918), Isla Culebra (18°13′N, 65°09′W) (Erdman, 1970), the Dominican Republic (Bonnelly de Calventi, 1994), Dominica (Gricks, 1994), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Gricks, 1994) north to St. Thomas (Erdman, 1970), Bonaire (Debrot et al., 1998), and Curaçao (Debrot, 1998). Notarbartolo di Sciara observed a picture of a local specimen in the Natural History Museum of Port of Spain, Trinidad. There are few reliable records for the Gulf of Mexico, where it is considered relatively rare (Mullin et al., 1994c; Jefferson and Schiro, 1997; O'Sullivan and Mullin, 1997).

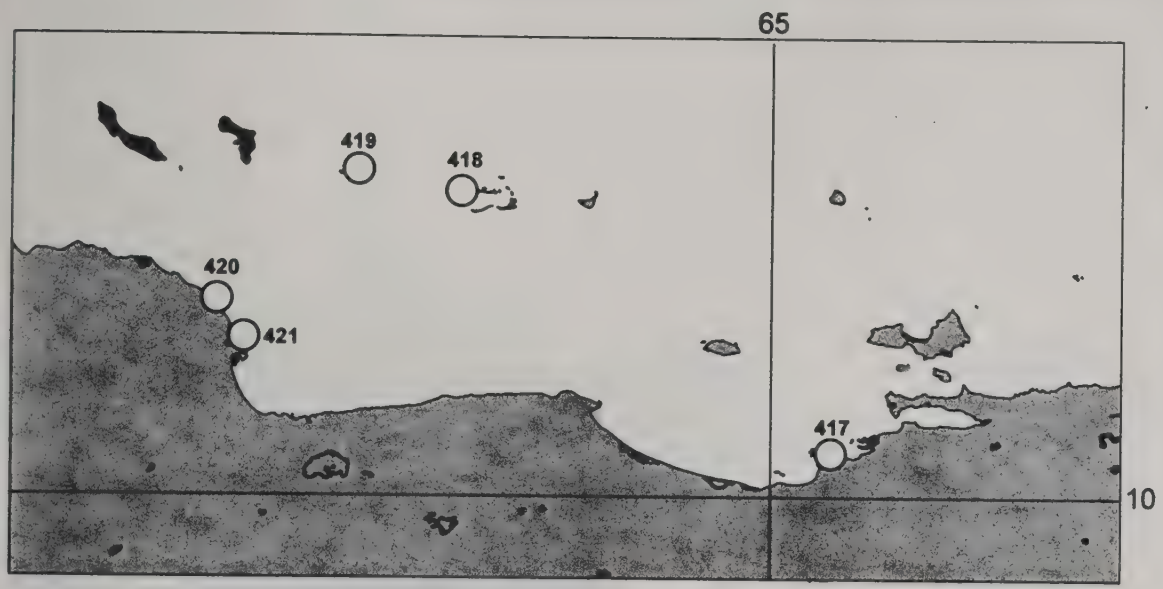

Figure 16

Pseudorca crassidens occurrences by record number from Table 2.

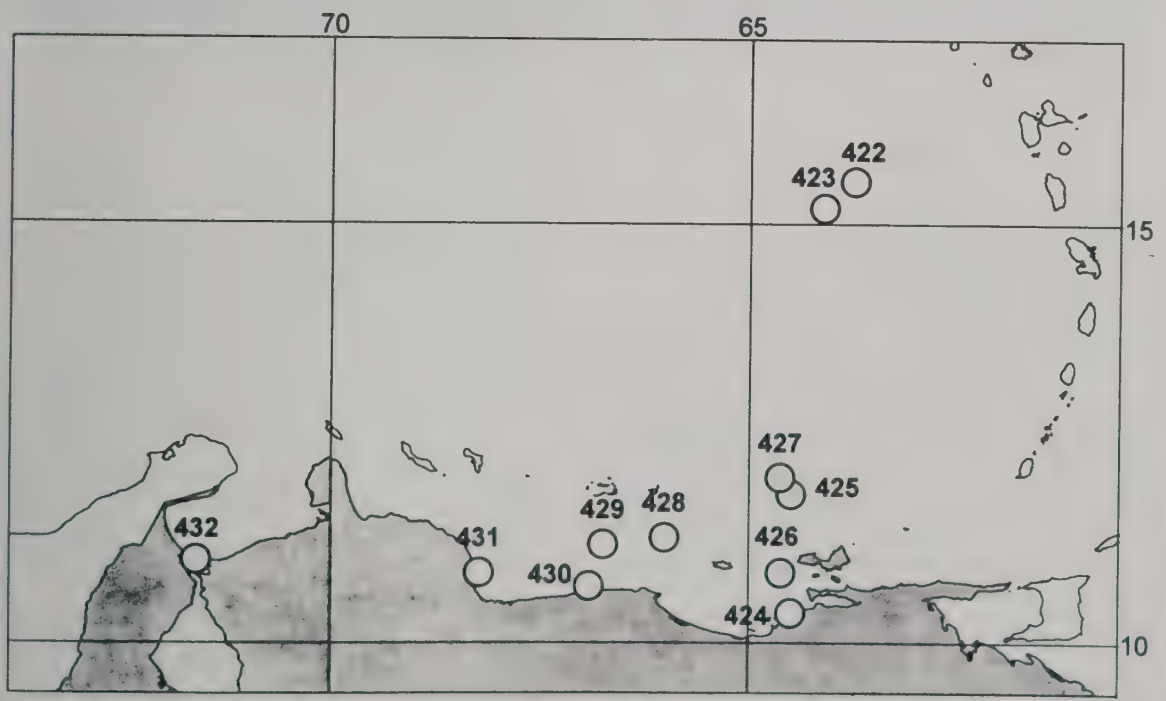

Figure 17

Orcinus orca occurrences by record number from Table 2.

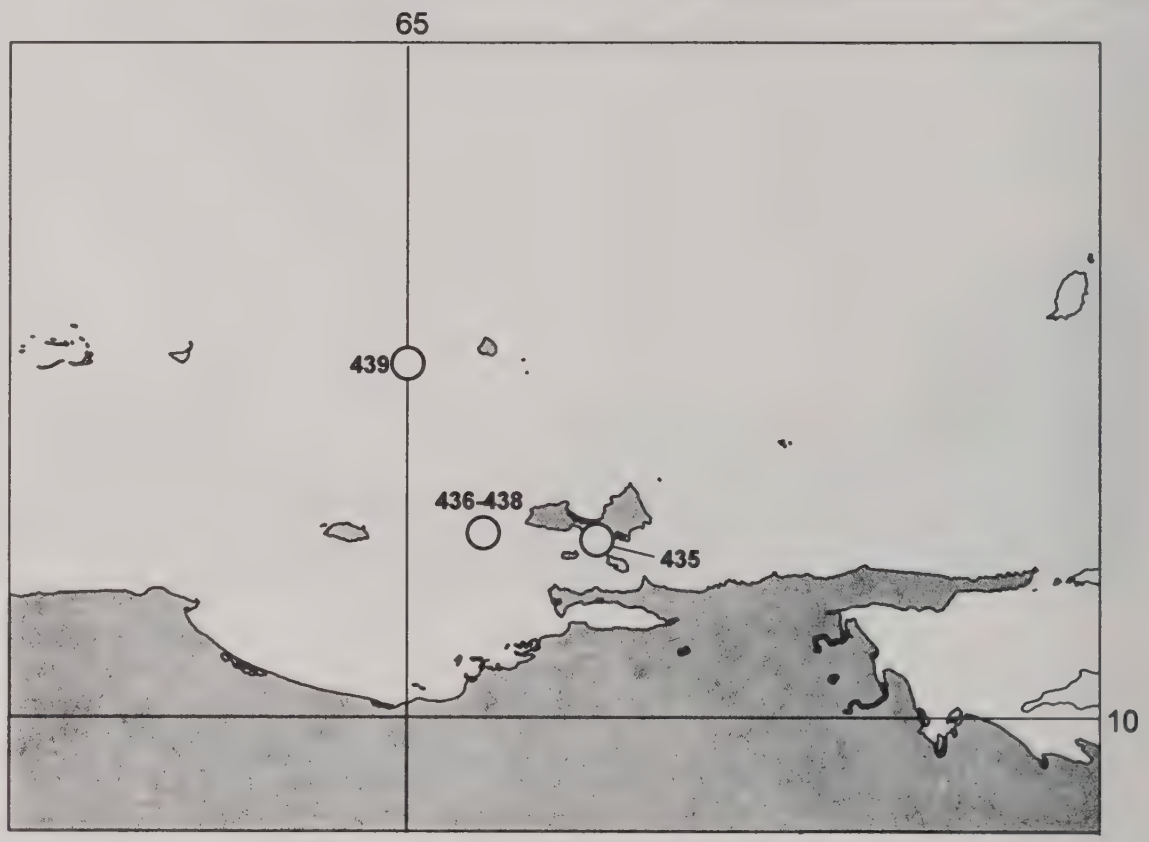

Figure 18

Globicephala macrorhynchus occurrences by record number from Table 2.

Genus *Globicephala* Lesson, 1828

***Globicephala macrorhynchus* Gray, 1846, short-finned pilot whale**

Spanish common names Ballena cabeza de olla, ballena piloto, ballena piloto de aleta corta, cachalote, calderón, calderón de aletas cortas, calderón de aletas pectorales cortas, calderón negro, calderón tropical, *golfín (Sucre and Nueva Esparta States), ballena piloto de aleta corta.

Proposed Spanish common name Vidal's (1990) name of "calderón de aletas pectorales cortas," besides being a literal translation from English, is extremely long for a common name; Casinos' (1986) "calderón tropical" or "calderón de aleta" are imprecise since other Globicephalinae are tropical and all have distinctive fins. We propose the simplest term: "calderón."

Global distribution Mostly pelagic in tropical and warm-temperate waters (Bernard and Reilly, 1999).

Occurrence in Venezuela Eastern waters (Table 2; Fig. 18).

Threats None known in Venezuela.

Conservation status It is classified as "Lower Risk: Conservation Dependant" by the WCMC and is in Appendix II of CITES.

Remarks It is extremely common in the Caribbean, with records from Cuba (De La Torre, 1887; Cuní, 1918; León and Aguayo, 1945; Aguayo, 1954; Varona, 1974; Mitchell, 1975), Jamaica (Mignucci-Giannoni, 1996), Martinique (Klinowska, 1991; Mignucci-Giannoni, 1996), Haiti (Caldwell and Erdman, 1963; Casinos, 1986), the Dominican Republic (Bonnelly de Calventi, 1994), Puerto Rico (Caldwell and Erdman, 1963; Erdman, 1970; Erdman et al., 1973; Mignucci-Giannoni, 1996), the Virgin Islands (Caldwell and Erdman, 1963; Mignucci-Giannoni, 1996), Anguilla (Mignucci-Giannoni, 1996), Nevis (Caldwell et al., 1970; Caldwell et al., 1971a; Watkins and Moore, 1982), Antigua (Mignucci-Giannoni, 1996), Guadeloupe (True, 1889; Caldwell and Erdman, 1963; van Bree, 1975), Dominica (Caldwell and Erdman, 1963; Caldwell et al., 1971a; Varona, 1974; van

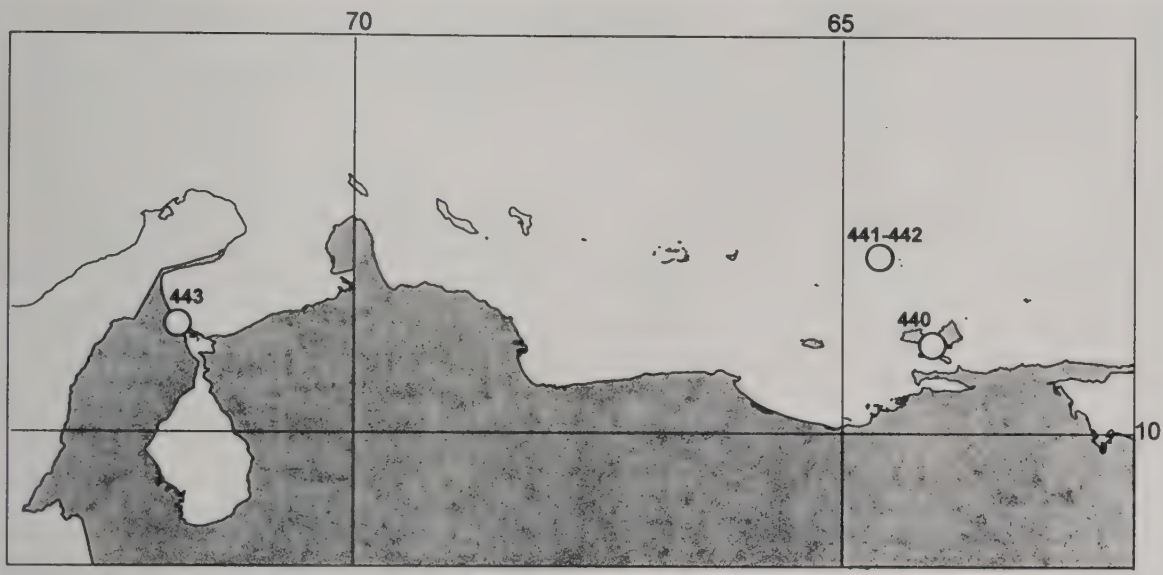

Figure 19

Ziphius cavirostris occurrences by record number from Table 2.

Bree, 1975; Reeves, 1988), St. Lucia (Morice, 1958; Caldwell and Erdman, 1963; van Bree, 1975; Watkins and Moore, 1982; Reeves, 1988), St. Vincent (Brown, 1945, 1947 [cited in Caldwell et al., 1971a]; Hickling, 1950 [cited in Caldwell et al., 1971a]; Fenger, 1958; Morice, 1958; Caldwell and Erdman, 1963; Caldwell et al., 1971a; Caldwell and Caldwell, 1971b; Rathjen and Sullivan, 1976; van Bree, 1975; Watkins and Moore, 1982; Price, 1985; Mignucci-Giannoni, 1996), between Bonaire and Klein Bonaire (Debrot et al., 1998), Curaçao (Debrot, 1998; Debrot et al., 1998), Aruba (Debrot et al., 1998; also mistakenly reported as *Pseudorca crassidens* in Agudo and Ponson, 1996), Colombia (Casinos and Bou, 1980; Cuervo Díaz et al., 1986; Vidal, 1990), and Mexico (Yucatán peninsula) (Morales Vela and Olivera Gómez, 1993). There are also numerous records from the Gulf of Mexico (Jefferson and Schiro, 1997).

Superfamily ZIPHIOIDEA (Gray, 1865) Fraser and Purves, 1960

Family ZIPHIIDAE Gray, 1865

Genus *Ziphius* G. Cuvier, 1823

***Ziphius cavirostris* G. Cuvier, 1823, Cuvier's beaked whale**

Spanish common names Ballena de Cuvier, ballena hocicuda, ballena pico de ganso, ballena picuda, ballena picuda de Cuvier, ballenato de Cuvier, *cochino marino (Zulia), *serpa (northeastern Venezuela), *zerpa (northeastern Venezuela), zifio común, zifio de Cuvier.

Proposed Spanish common name There is a great deal of confusion surrounding vernacular names for this species. Vidal's (1990) and Casinos' (1986) denominations of "ballena picuda de Cuvier" and "ballenato de Cuvier," respectively, perpetuate the popular misassignment of this species to the mysticetes. We propose the use of "zifio común," a truly vernacular name in many Spanish-speaking countries and a very distinct one.

Global distribution Cosmopolitan except for polar waters. Mostly pelagic (Heyning, 1989a).

Distribution in Venezuela The few records are sparse (Table 2; Fig. 19).

Threats No threats are presently known in Venezuela, but in Bonaire, off Venezuela, four decomposed bodies washed ashore on an island following an underwater explosion related to military exercises (van Bree and Kristensen, 1974; Simmonds and López-Jurado, 1991).

Conservation status It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES.

Remarks This is a rarely observed species known mostly from strandings, the most numerous reported for any of the beaked whales (Heyning, 1989a). It apparently avoids vessels by diving, thus making sightings rare. It is not an infrequent species in the general area since it has also been reported for the nearby islands of Bonaire (van Bree and Kristensen, 1974), Aruba (Agudo and Ponson, 1996), and Curaçao (van Bree et al., 1973; Debrot and Barros, 1994; Debrot et al., 1998) as well as in adjacent waters (8°02′N, 14°05′W, van Bree et al., 1973).

The reports for other Caribbean locations are numerous and widespread: Cuba (Aguayo, 1954; Varona, 1964; Erdman, 1970; Ubeda, 1971 [cited in Mignucci-Giannoni, 1996]; Varona, 1974), the Bahamas (Varona, 1974; Gricks, 1994), Grand Cayman (Mignucci-Giannoni, 1996), the Dominican Republic (Bonnelly de Calventi, 1994), Puerto Rico (Erdman, 1961, 1962; Moore, 1968; Erdman, 1970; Erdman et al., 1973; Varona, 1974; Mignucci-Giannoni, 1996), the U.S. and British Virgin Islands (Mignucci-Giannoni, 1996), St. Martin (van Bree et al., 1973; van Bree and Kristensen, 1974), Barbados (Caldwell et al., 1971a,b; Mignucci-Giannoni, 1996), St. Vincent (Caldwell et al., 1971b; Caldwell and Caldwell, 1975; Gricks, 1994), and Colombia (Prieto Rodríguez, 1988; Vidal, 1990). It is also reported for the Gulf of Mexico (Jefferson and Schiro, 1997).

Tello (1979) first reported it for Venezuela but did not cite any source for his information. None of the literature he reviewed mentions it for Venezuela, so we are unclear about the basis for his report. Casinos (1981) reported the first confirmed Venezuelan specimen.

Discussion

Quantitative analyses

The records summarized here represent individual records of occurrences by species and by locality. As such, there is little meaningful analysis that can be performed because not only do they not represent any kind of statistically valid sampling (such as an appropriate census or survey), but they are also certainly affected by a variety of biases, generally of unknown magnitude and direction. The likelihood of a record being produced can be independently affected by geographical habits of both the species and the observers, the behavior and recognizability of the species and their propensity to be captured or stranded, observers' inclinations and capabilities to describe and record, etc. Undoubtedly there are also strong interactions among these and other variables, affecting the presence or absence of records at different locations.

Nevertheless, there are a few summary analyses that may be useful to compare with other similar compilations of cetacean records in other areas affected by the same factors. These need to be viewed with considerable caution, however, because such factors as observers' recording inclinations, species' habits, etc., may vary greatly by geographical location. Comparisons among species may also be of some value, but, once again, they must be viewed with caution. Such simple figures as the number of records for each species are strongly affected by many factors that have no specific relationship with the species' relative abundance. For example, number of potential observers in areas animals frequent, ease of observing, diving depth and surfacing habits of species, etc., all affect the number of records produced.

Sources of records: sightings vs. strandings

The origin of records in Venezuela is summarized in Table 4. Looking only at the total number of records for Venezuela (i.e., 443) independent of the number of individual animals reported, we find that there are nearly five times more that correspond to sightings than to strandings (4.67:1). This figure contrasts sharply with results obtained in a similar analysis for Great Britain, where the ratio of sighting to stranding records was 1.25:1 (Evans, 1980). Our figure is conservative in that we have classified records that combine sightings and strandings into the stranding category. If we adopt the most conservative approach and assign the 62 records of collection specimens—virtually all resulting from animals that were captured or stranded—to strandings, we reduce our ratio to 2.24:1, still almost double the result for Great Britain.

There are at least two reasonable interpretations of this difference. First, it is possible that strandings along the Venezuelan coast are unusual occurrences with respect to the overall abundance of cetaceans in its waters. This explanation is consistent with the results of a recent report for cetaceans of the Leeward Dutch Antilles (Bonaire, Curaçao, and Aruba), the geographically closest possible non-Venezuelan comparison. It yielded a 3.12:1 ratio of sightings to strandings ($n = 70$, Debrot et al., 1998), a result closer to our findings for Venezuela reported in this paper than that reported for Great Britain. It is therefore possible that there is a difference in the probability of being stranded on the British Isles than in this region, a circumstance that could arise from a variety of behavioral, health, meteorological, or oceanographic origins.

The second interpretation is that strandings on the coasts of Great Britain occur in the same low proportion as we found for Venezuela, but are much more likely to be observed and/or recorded. This explanation is supported by the long-standing tradition of reporting a stranded cetacean (a "royal fish") in the U.K., by the existence of stranding networks there for which there are no parallels in Venezuela, and possibly by the persistence of remains in the British climate due to a slower rate of decomposition. There is, nevertheless, no certain way to distinguish between the alternative explanations of an actual difference in strandings, a reporting difference, or some combination of both.

Species differences

Records of *I. geoffrensis* account for almost half the total (49%, Table 4). Records of *D. capensis* (9%) and *S. fluviatilis* (8%) are the next most frequent.

Table 4

Types of cetacean records for Venezuela by species.

Species	Sightings[1]	Strandings[2]	Hunting/incidental capture[3]	Museum specimen[4]	Total records
B. borealis	3				3
B. edeni	12	9	1		22
B. physalus		3			3
M. novaeangliae	5	3	4		12
P. macrocephalus	7	2	2	1	12
I. geoffrensis	162	1	25	28	216
S. bredanensis	1	1			2
S. fluviatilis	17	10	2	8	37
G. griseus	1		1		2
T. truncatus	4	6	4	6	20
S. frontalis	6	5	3	9	23
S. attenuata	1				1
S. longirostris	13		3	1	17
S. clymene			1		1
S. coeruleoalba	3				3
D. capensis	14	8	11	7	40
F. attenuata		1			1
P. crassidens	2	3	1		6
O. orca	9	1		1	11
G. macrorhynchus	5	2			7
Z. cavirostris	1	2		1	4
Total	266	57	58	62	443

[1] Sightings include photographic, videotape, tagging (capture/release) records, and unspecified reports.

[2] Strandings that are not a result of hunting or incidental capture; also includes records within which both sighting and stranding are reported; includes stranding records where the remains may eventually become a museum specimen.

[3] Includes records where both sighting and capture are reported, strandings of wounded animals, and those instances when a hunted or captured animal may eventually become a museum specimen.

[4] Only specimens whose records do not indicate that cause of death was stranding, hunting, or incidental capture.

These results illustrate the confounding of species abundance and likelihood of observers to record. There is little doubt that *D. capensis* is the most common marine cetacean in Venezuela, so it is not surprising that reports are numerous. The abundance of *I. geoffrensis* and *S. fluviatilis*, on the other hand, is comparatively low (see earlier Results, Systematic List), but they inhabit river or coastal areas with good visibility and/or high human population density, and are thus very likely to be over-represented in the records. Note that species represented by only a single record, namely *S. attenuata*, *F. attenuata*, and *S. clymene*, may, in parallel fashion, either be rare in Venezuelan waters, may be very difficult to correctly identify, or may have habits that, in conjunction with the habits of human observers, do not make them likely to be recorded. *B. edeni* is the most common mysticete in the records, with strandings and sightings contributing about equally to the number of reports. This may reflect that aggregations in its spring and summer feeding areas coincide with intense fishing activity (both whales and fishermen are frequent in these productive eastern waters); it is also an area frequented by commercial boat traffic. In addition, we suggest that the stranding of a whale is considered more noteworthy and hence more likely to be recorded than that of a small delphinid.

Debrot et al. (1998) examined records for the Leeward Dutch Antilles, the group of islands north of the western Venezuelan coast. They also found the most common species of mysticete to be *B. edeni*. The most common odontocete for those islands is *S. longirostris* (10% of their records) and they have no records for *D. capensis*. We found *S. longirostris* to be reported for Venezuelan waters at comparable levels (nearly 9% of our records of marine species), but *D. capensis* is our most frequently reported marine cetacean in Venezuela. Its absence from their records might at first seem surprising, but it is important to note that all of our records for this species are concentrated in the eastern part of the country, far from their area of study. It should also be noted that although *D. capensis* is not uncommon in the Caribbean (Heyning and Perrin, 1994; Rice, 1998), it is very rare in the Gulf of Mexico (Jefferson and Schiro, 1997). Thus, it is quite pos-

Table 5

Annual distribution of marine records of cetaceans for Venezuela.

	Month											
Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
B. borealis		1					1		1			
B. edeni		1	2	1	2	1	1	4	4	1	3	
B. physalus		1						1				
M. novaeangliae	2	3	3	3	1				1	1		1
P. macrocephalus	1		1					2	1			
S. bredanensis								1				
S. fluviatilis		5	4	3	3	2					1	
G. griseus								2				
T. truncatus			4	3	1		1		3			
S. frontalis	1	4	1	1	1	1		2	3			
S. attenuata												
S. longirostris		1		1	1			5		2	3	
S. clymene								1				
S. coeruleoalba			1				1	1				
D. capensis	3	7	1		3	3	1	3	3	2	1	1
F. attenuata		1										
P. crassidens			1			1	1	1				
O. orca	1		1				1	1		2		
G. macrorhynchus						1				1		
Z. cavirostris							1			1		
Total	8	24	19	12	12	9	8	24	16	10	8	2

Table 6

Annual distribution of freshwater cetacean records for Venezuela (excludes marine or estuarine records for these species).

	Month											
Species	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
I. geoffrensis	4	7	17	26	31	10	4	8	6	15	8	2
S. fluviatilis	3	1	2	1	1	1	2	2	1	6	1	1
Total	7	8	19	27	32	11	6	10	7	21	9	3

sible that this delphinid has narrow local geographical ranges and habitat preferences.

Seasonal variation

Table 5 reveals an uneven bimodal annual distribution of records for marine cetaceans in Venezuela (H_0=uniform; X^2=69.8, *df*=11, p<0.001). Debrot et al. (1998) did not find a particular pattern of abundance for cetacean species in the Leeward Dutch Islands. The reason for that may be that those waters, unlike the eastern waters of Venezuela where most of the cetacean records are from, are not greatly affected by the seasonal changes in the discharges of the Orinoco and Amazon rivers.

Table 6 shows an uneven bimodal annual distribution of records for the freshwater records of cetaceans in Venezuela. It also exhibits a non-uniform annual distribution (X^2=40.2, *df*=11, p<0.001).

The temporal records for *I. geoffrensis* reflect an interaction between its ecology and human activity. Most records occurred between March and May from drainage areas experiencing the peak of the dry season. When water levels are low, access is easiest for observers and freshwater dolphins are most visible. Most of the records for the rainy season (June–November), however, originate from the Orinoco River and its delta, a very large drainage system whose water volume is less affected by seasonal precipitation.

The few freshwater records for *S. fluviatilis* reveal a rather homogeneous distribution (X^2=12.9, df=11, p>0.05). This is consistent with the non-migratory nature of the species and the fact that most records originated from coastal outlets or riverine areas that do not experience major seasonal variations in human population or activity.

Although both marine and freshwater annual distributions are bimodal, their patterns do not coincide (Pearson's r=0.112, Spearman's ρ=0.428; p>.05). There is an August–September dip in records for the freshwater records whereas at the same time the marine records are at their second annual peak. Both exhibit a minimum for the December–January period, the time of year that is a traditional "fishermen's holiday" (Romero et al., 1997b). The paucity of winter records reflects at least partial dependence of the number of records on human activity, but if that alone accounts for the low numbers, we would expect a relatively greater effect on marine species than is shown. This illustrates, once again, the difficulty of interpreting records of this kind as unambiguously reflecting either the natural history of the animals or the biases of human reporting.

Spatial distribution

Any interpretation of geographical variation must be considered in light of the distribution of fish, the common prey both for fishermen and for most cetaceans. An abundance of sighting and capture records from any locality certainly indicates presence of a species, but a paucity or absence of records could be attributed to an absence of fishing boats rather than definitely indicating the absence of a cetacean species.

There clearly are seasonal locale-dependent variations in the abundance of fish and they can be expected to affect the seasonal location of their predators. The mysticetes, as well, undoubtedly have seasonal movements, their prey perhaps influenced by the same patterns of nutrient enrichment that affect fish. The periodic enrichment in the eastern Caribbean results from the presence of continental waters that come from the Orinoco delta, enter through the Dragon's Mouth as well as the pass between Trinidad and Tobago, and produce an upwelling of enriched waters at about 63°W. This is evident between July and October, the months of greatest discharge from the Orinoco River (Monente, 1997).

This upwelling and its effect on fish abundance is reflected in 60% of the fishing take occurring off the eastern coasts, Anzoátegui, Sucre, and Nueva Esparta (Gómez Gaspar, 1996). The Orinoco also has tremendous influence in the Paria Gulf, particularly during the rainy season (May–November). Additional geographical influences arise from the littoral lagoons and the Amazon River.

Table 7

Summary of confirmed and expected cetacean species for Venezuela (see text for each species for evidence).

Species	Confirmed	Possibility
B. acutorostrata		Unlikely
B. borealis	X	
B. edeni	X	
B. physalus	X	
M. novaeangliae	X	
P. macrocephalus	X	
K. breviceps		Likely
K. sima		Very likely
I. geoffrensis	X	
S. bredanensis	X	
S. fluviatilis	X	
G. griseus	X	
T. truncatus	X	
S. frontalis	X	
S. attenuata	X	
S. longirostris	X	
S. clymene	X	
S. coeruleoalba	X	
D. capensis	X	
L. hosei		Likely
P. electra		Likely
F. attenuata	X	
P. crassidens	X	
O. orca	X	
G. macrorhynchus	X	
M. densirostris		Likely
M. europaeus		Very likely
Z. cavirostris	X	

The records of cetaceans in Venezuelan marine waters also show a distinct pattern. Of the 165 marine records with longitude noted, 119 (72%) are from 63°05′W through 65°26′W, with the remainder tapering off as locality records are examined to the east and to the west (mean 64.9°W, SD=2.0; median 64.4°W, range 61.6°–72.9°W). This is consistent with the productivity of Venezuelan waters, which is high at this longitude, due largely to the influence of periodic enrichment by sediments from the Orinoco and Amazon rivers, and diminishes in both easterly and westerly directions (Monente, 1997). Similar studies carried out with planktivorous fish have also shown consistency with such productivity patterns (Romero et al., 2000).

Conservation status

At least seven of the cetacean species confirmed for Venezuela should be considered "Threatened" (i.e., *I. geoffrensis* and those with CITES status "I"; Table 3).

The principal risk is hunting, but incidental captures, live-collecting, and habitat disruption are also serious concerns (Romero et al., 1997b).

Current knowledge and expected species

There are 83 species of cetaceans in the world (Rice, 1998). In this paper we confirm the presence of 21 of them in Venezuelan waters from a variety of records, but systematic, long-term efforts have not been made to survey the cetacean fauna in this area. Almost without exception, the records summarized here are the result of opportunistic and incidental rather than systematic and intentional observations and identifications of stranded or captured animals. We believe that an additional seven species of cetaceans will be added to this list based on their distribution in adjacent waters and on other locality reports, although some may be occasional visitors or strays rather than residents. They are listed below in the systematic order offered by Perrin et al. (1994b).

***Balaenoptera acutorostrata* Lacépède, 1804, minke whale** This is a cosmopolitan species that can be found in both coastal and pelagic waters. Although there are two reports for Venezuela, we consider them to be doubtful. The report for Margarita Island (Cervigón and Velázquez, 1981) could be *B. edeni*. The report from the area between Isla La Tortuga and Margarita in 1873 (Ernst, 1877, 1886) is inconclusive as to species. The minke whale has been reported for the Bahamas (Varona, 1974), the Dominican Republic (Bonnelly de Calventi, 1994; Gricks, 1994), Anguilla (Leatherwood et al., 1976), Antigua and Guadeloupe (Gricks, 1994), and the Gulf of Mexico (Jefferson and Schiro, 1997), but these localities are distant from Venezuelan waters. The confirmed record nearest to Venezuelan waters is from Surinam (Slijper et al., 1964; Husson, 1978). If a minke whale is found in Venezuela, it is likely to have strayed from its usual environs.

***Kogia breviceps* (Blainville, 1838), pygmy sperm whale** This is another cosmopolitan species (except for polar waters), mostly neritic and also pelagic (Caldwell and Caldwell, 1989). It has been reported for the Colombian Caribbean (Prieto Rodríguez, 1988; Vidal, 1990) and elsewhere in the Caribbean, including Cuba (León and Aguayo, 1945; Aguayo, 1954; Varona, 1974; Caldwell and Caldwell, 1975; Gricks, 1994), Puerto Rico (D.S. Erdman in Caldwell and Caldwell, 1989; Gricks, 1994; Mignucci-Giannoni, 1996), the U.S. Virgin Islands (Mignucci-Giannoni, 1996), the Dominican Republic (Bonnelly de Calventi, 1994), Dominica (Gricks, 1994), St. Vincent (Caldwell and Caldwell, 1975, 1989), and in the Gulf of Mexico (Jefferson and Schiro, 1997). Notarbartolo di Sciara has repeatedly sighted it off Martinica. With these occurrences throughout nearby waters, we expect it to be an occasional visitor to Venezuelan territorial waters.

***Kogia sima* (Owen, 1866), dwarf sperm whale** This is a pelagic species found in tropical and warm-temperate oceans of the world (Caldwell and Caldwell, 1989). Although there are fewer records for the Caribbean in general for this species than for *K. breviceps*, we expect it to be present in Venezuelan waters since it has been reported for the nearby island of Klein Curaçao (Debrot and Barros, 1992), in Aruba (Debrot et al., 1998), and in the Colombian Caribbean (Cuervo Díaz et al., 1986; Muñoz-Hincapié et al., 1998). It has also been reported for Cuba (León and Aguayo, 1945), Puerto Rico (Mignucci-Giannoni, 1996), St. Vincent (Caldwell et al., 1973; Caldwell and Caldwell, 1975) and the Gulf of Mexico (Jefferson and Schiro, 1997).

***Lagenodelphis hosei* Fraser, 1956, Fraser's dolphin** This is an uncommon pantropical and mostly pelagic species (Perrin et al., 1994c). Most reports are from the high seas, particularly around oceanic islands, with relatively few from strandings. It has been found in Puerto Rico (Mignucci-Giannoni et al., 1999), Dominica (Gricks, 1994; Watkins et al., 1994), St. Vincent (Caldwell et al., 1976; Gricks, 1994) and the Grenadines (Gricks, 1994). Cuervo Díaz et al. (1986) believe it to be present in the Colombian Caribbean. There are seven verified records for the Gulf of Mexico (Jefferson et al., 1993). As is the case for most oceanic small cetaceans, little is known about it, so there is no basis even for speculating about its distribution in Venezuelan waters.

***Peponocephala electra* (Gray, 1846), melon-headed whale** This is a pantropical and pansubtropical pelagic species (Perryman et al., 1994). Mignucci-Giannoni (1996) mistakenly reported it for Venezuela. A sighting off Klein Bonaire and a stranding report for Curaçao (Debrot et al., 1998) lead us to believe that it should be found in Venezuelan waters. It has also been reported for Puerto Rico (Mignucci-Giannoni et al., 1998b) and St. Vincent (Caldwell et al., 1976; Watkins et al., 1997), and Notabartolo di Sciara has observed it several times off the west coast of Dominica (see also Watkins et al., 1997). Cuervo Díaz et al. (1986) believe it to be present in the Colombian Caribbean. According to van Bree (1975), it "may occur" in the southern Caribbean. There are 12 reliable records for the Gulf of Mexico (Barron and Jefferson, 1993; Mullin et al., 1994a).

***Mesoplodon densirostris* (de Blainville, 1817), Blainville's beaked whale** Found in tropical and warm-temperate seas of the world, it is mostly pelagic in deep seas, but is also occasionally coastal. It has the widest

global distribution of all the *Mesoplodon* species (Mead, 1989). We have not been able to confirm the only report for Venezuela from the waters around Margarita Island, given by Susach and cited in Casinos (1986). Its presence for Venezuelán waters is possible since it has been reported both for the Caribbean (Mead, 1989) and the Gulf of Mexico (Jefferson and Schiro, 1997). It has been reported for the Bahamas (Gricks, 1994), Cuba (Varona, 1974), Grand Cayman Island (Gricks, 1994; Mignucci-Giannoni, 1996), and Puerto Rico (Mignucci-Giannoni, 1996). Cuervo Díaz et al. (1986) believe it to be present in the Colombian Caribbean. According to Klinowska (1991), "any country within the general distribution area could produce records in future." Van Bree (1975) believes that it "may occur" in the southern Caribbean.

***Mesoplodon europaeus* (Gervais, 1855), Gervais' beaked whale** It is found in tropical and warm-temperate waters of the Atlantic, much more frequently in the western than in the eastern Atlantic (Mead, 1989). Its presence in Trinidad (Fraser, 1955), Aruba (Agudo and Ponson, 1996), Bonaire (Debrot et al., 1998), and Curaçao (Debrot and Barros, 1992; Debrot, 1998) make it likely that is also frequents Venezuelan waters. It has also been reported for several locations in the Caribbean: the Bahamas (Gricks, 1994), Cuba (Aguayo, 1954; Rankin, 1956; Varona, 1970, 1974; Gricks, 1994), Jamaica (Rankin, 1953, 1954; Lewis, 1954; Rankin, 1955; Caldwell, 1964; Gricks, 1994), the Dominican Republic (Bonnelly de Calventi, 1994), St. Croix (Mignucci-Giannoni, 1996), Trinidad and Tobago (Gricks, 1994), and also for the Gulf of Mexico (Jefferson and Schiro, 1997).

Conclusions

Our results show that the number of marine cetacean records in Venezuelan waters reflects a geographical distribution that is congruent with areas of high productivity. The seasonal nature of those records also reflects seasonal variations of productivity. These results are interpreted to be consistent with recently published results for marine cetaceans of the Leeward Dutch Islands (Debrot et al., 1998), the geographically closest comparison. The absence of *D. capensis* from those islands may reflect narrow local ranges.

Systematic surveys, long term population studies, and behavioral studies tracking individual animals are all needed to provide an accurate picture of the distribution and abundance of cetaceans not only in Venezuelan waters but worldwide. The results of such studies would also permit evaluating how well our methods of compiling and analyzing records fairly reflects the actual spatial and temporal distribution and abundance of cetaceans. Such results would permit evaluating what biases are present in *ad hoc* records so that other similar compilations can be better interpreted.

Acknowledgments

Special thanks to Cristina Salazar and Carol Gersmehl who produced the GIS distribution maps in the Cartography Lab at Macalester College.

The following individuals provided useful information and/or cooperated in the preparation of the manuscript: Carlos Atilano (Ingeniería A y S C.A., Caracas), Francisco Bisbal (EBRG), Salvador Boher (IZT), Mario E. Capaldo (Obervatorio Naval Juan Manuel Cajigal, Caracas), Angel O. Colmenares (Fuomap & Asoc., Caracas), Liana Cortijo (Fundación Cultura 5, Caracas), Julia Creek (International Whaling Commission, Cambridge, UK), A. O. Debrot (CARMABI, Curaçao, N.A.), Luis Freites (Fundemar, Cumaná), Kay K. Hale (Library, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL), John Heyning (Natural History Museum of Los Angeles County, CA), Hubbs-Sea World Research Institute (San Diego, CA), Jaime Jiménez (Fundemar, Cumaná), Abdem Ramón Lancini (MCNC), Pablo Lau (La Salle), Daniel Lew (La Salle), Omar Linares (MCNUSB), Iván López (Fundemar, Cumaná), Asunción Martínez (Fundación Vuelta Larga, Guaraúnos-Carúpano), Enrique Marval (Fundemar, Cumaná), James G. Mead (USNM), Daniel Mueller (Fundación Vuelta Larga, Guaraúnos, Carúpano), Ricardo Muñoz-Tebar (Ingeniería A y S, Caracas), Luis Orive (Fundemar, Cumaná), Ernesto Pannier (MCNUSB), William F. Perrin (NOAA), Humberto Ramírez Nahím (Club Sexto Continente, Caracas), Carmen J. Rodríguez Blondell (VTV, Caracas), A. G. Rol (Zoologisch Museum, Amsterdam), Adri G. Rol (ZMA), Andrea Romero, Juan Ramón Romero (Dirección de Archivos Estatales, Ministerio de Cultura, Madrid, Spain), Javier Sánchez (EBRG), Genaro Solé (FUDENA, Caracas), Barbara Stein (MVZ), José Antonio Terán (MCNC), Ben Tuson (IUCN, Gland, Switzerland), Roberto Verginelli (Fundemar, Cumaná), Angel Luis Viloria (Museo de Biología, La Universidad del Zulia, Maracaibo).

Angela Bancalari (Florida Atlantic University) was extremely helpful in obtaining information that otherwise was not available to the authors.

Literature cited

Adams, J. E.
1971. Historical geography of whaling in Bequia Island, West Indies. Caribb. Studies. 11(3):55–74

Aguayo, C. G.
1954. Notas sobre cetáceos de aguas cubanas. Circ. Mus. Biblioteca Zool. Habana 13 (315):1125–1126.

Agudo, A. I.
1990. Preliminary report on death of cetaceans in gill nets in northeastern Venezuelan waters. *In* International Whaling Commission Symposium on Mortality of Cetaceans in Passive Fishing Nets and Traps. La Jolla, Calif.; Oct. 20–21, 1990, p. 1 (abstract).
1993. Identidad taxonómica específica de esqueleto de ballena barbada exhibido en el Museo del Mar, Cumaná-Sucre. Acta Cient. Venez. 44(Suppl. 1):345.
1995a. Varamentos de cetaceos mariños e de esteiro en Venezuela (Caribe Sudoriental, America do Sur). Eubalaena (6):7–22.
1995b. Nota sobre a presencia de *Grampus griseus* (Cuvier, 1812) e de *Physeter macrocephalus* Linnaeus, 1758 (CETACEA, ODONTOCETI) en aguas de Venezuela (Caribe Sudoriental, America do Sur). Eubalaena (7):22–27.

Agudo, A. I., and M. E. Ponson Jr.
1996. Primeiro rexistro de cetaceos na illa de Aruba (Antillas Holandesas). Eubalaena (9):5–9.

Agudo, A. I., and A. Romero.
1996. Catalogo dos cetaceos de Venezuela (America do Sur) depositados en museos e coleccions bioloxicas nacionais e estranxeiras. Eubalaena(8):14–24.

Agudo, A. I., A. L. Viloria, J. R. Coty, and R. J. Acosta.
1994. Cetofauna (Mammalia: Cetacea) del Estado Zulia, Venezuela nor-occidental. Anartia (5):1–23.

Allen, J. A.
1881. Preliminary list of works and papers relating to the mammalian orders CETE and SIRENIA (1495–1840). Bull. U.S. Geol. Geogr. Surv. Terr. 6(3):399–562.

Alvarado, M., A. Kaffoussias, A. Rangel, L. Ostos, A. Vidal O., and O. Villasmil.
1995. *Stenela* (sic) *frontalis*, *Tursiops truncatus* y *Sotalia fluviatilis* en el Golfo de Venezuela y el Estrecho del Lago de Maracaibo. *In* Libro de Resumenes, III Congreso Latinoamericano de Ecología, 22–28 de Octubre de 1995 Mérida, Venezuela, p. 24–3.

Anderson, S.
1997. Mammals of Bolivia, taxonomy and distribution. Bull. Amer. Mus. Nat. Hist. (231):1–652.

Anduze, P. J.
1960. Shailili-Ko. Relato de un Naturalista que también llegó a las fuentes del Orinoco. Caracas: Talleres Gráficos Ilustraciones, 412 p.

Anonymous.
1843. Buques balleneros. El Manzanares. 21/3/1843.
1990. Revista Producto. July, 82:22.

AOU.
1998. Check-list of North American birds. The species of birds of North America from the Arctic through Panama, including the West Indies and Hawaiian Islands. The Committee on Classification and Nomenclature of the American Ornithologists' Union, Allen Press, Lawrence, KS, 829 p.

Appun, K. F.
1871. Unter den Tropen. Wanderungen durch Venezuela, am Orinoco, durch Britisch Guyana und am Amazonenstrome in den jahren 1849–1868. Hermann Costenoble, Jena, Germany, 2 vols.

Backus, R. H.
1961. Stranded killer whale in the Bahamas. J. Mammal. 42:418–419.

Bacon, P.
1975. Dolphin record. Journal of the Trinidad & Tobago Field Naturalists' Club 1975:83.

Barnes, L. G., D. P. Domning, and C. E. Ray.
1985. Status of studies on fossil marine mammals. Mar. Mammal Sci. 1(1):15–53.

Barron, G. L., and T. A. Jefferson.
1993. First records of the melon-headed whale (*Peponocephala electra*) from the Gulf of Mexico. Southwestern Natur. 38(1): 82–85.

Bernard, H. J., and S. B. Reilly.
1999. Pilot whales *Globicephala* Lesson, 1828. *In* S. H. Ridgway and R. Harrison (eds.), Handbook of marine mammals, vol. 6. The second book of dolphins and the porpoises, p. 245–279. Acad. Press, San Diego, CA, 486 p.

Best, R. C., and V. M. F. da Silva.
1983. Distribution of freshwater dolphins and manatees in the upper Rios Negro and Orinoco. Biennial Conference on the Biology of Marine Mammals, 5th. Boston, Abstracts, p. 9. Society for Marine Mammalogy.
1989a. Amazon River dolphin, Boto *Inia geoffrensis* (de Blainville, 1817). *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 4. River dolphins and the larger toothed whales, p. 1–23. Acad. Press, London, 442 p.
1989b. Biology, status and conservation of *Inia geoffrensis* in the Amazon and Orinoco River basins. *In* W. F. Perrin, R. L. Brownell Jr., K. Y. Zhou, and J. K. Liu (eds.), Biology and conservation of the river dolphins, p. 23–34. IUCN Species Survival Comm. Occas. Pap. 3, 173 p.

Boede Wantzelius, E. O.
1990. Management of gastrointestinal problems in Orinoco river dolphins (*Inia geoffrensis*) kept in captivity at Aquarium J. V. Seijas, Venezuela. Proc. Amer. Assoc. Zoo Veter. Ann. Meet. Oct. 21–26, 1990, p. 40–42.

Bolaños, J., and S. Boher.
1998. Un varamiento masivo de delfin manchado del Atlantico (*Stenella frontalis*) en la Isla La Tortuga, Nororiente de Venezuela. *In* Programaçâo-Resumos, 8o Reumião de Trabalhos de Especialistas em Mamíferos Aquáticos da América do Sul, Olinda, Brazil 25–29 Outubro 1998, p. 26.

Bolaños, J., C. Lira, and G. Vásquez.
1995. On a massive stranding of common dolphins (*Delphinus delphis*) in the island of Margarita, Venezuela. *In* Abstracts, Eleventh Biennal Conference on the Biology of Marine Mammals (Society of Marine Mammalogy), Orlando, FL, December 1995, p. 13.

Bolaños Jiménez, J.
1994. Inventario de muestras biológicas de cetáceos y sirénidos existentes en los museos de Venezuela: una base de datos en Dbase III plus. Departamento de Estudios Ambientales, Universidad Simón Bolívar, Sartenejas, Venezuela, 41 p.

Bolaños Jiménez, J., and C. Lira.
1993. Varamiento de un ejemplar de *Balaenoptera physalus* (Linnaeus 1758) en Playa El Silguero, Isla de Margarita. Informe Técnico, Profauna, Caracas, 17 p.

Bonnelly de Calventi, I.
1994. Mamíferos Marinos en la República Dominicana. República Dominicana, CIBIMA - DEBIO - WWF - FUNDEMAR, 77 p.

Borobia, M.
1990. Survey of *Sotalia fluviatilis* in the Casiquiare Canal, Venezuela (Project). *In* S. Leatherwood and C. L. Hill (eds.), Newsletter of the Cetacean Specialist Group (CSG - Oct. 6, 1990) (6):9.

Borobia, M., S. Siciliano, L. Lodi, and W. Hoek.
1991. Distribution of the South American dolphin *Sotalia fluviatilis*. Can. J. Zool. 69:1025–1039.

Brown, H. H.
1942. The sea fisheries of Barbados. Development and welfare in the West Indies, Bull. 1. Advocate Printers, Barbados, 32 p.

1945. The fisheries of the Windward and Leeward islands. Development and welfare in the West Indies, Bull. 20, Advocate Printers, Barbados, 97 p.

1947. Memorandum (June 1945) on the fishing industry in St. Vincent and the St. Vincent Grenadines. *In* B. Gibbs (ed.), A plan of development for the colony of St. Vincent, Windward Islands, British West Indies, p. 408–414. Guardian Commercial Printery, Trinidad.

Brownell, R. L., Jr.

1984. Live-capture fisheries for small cetaceans in South American waters. Rep. Int. Whal. Comm. 34:747.

Brownell R. L., Jr., K. Ralls, and W. F. Perrin.

1989. The plight of the 'forgotten' whales. Oceanus 32(1):5–11.

Bruyns, W. F. J. M.

1969. Sight records and notes on the false killer whale, *Pseudorca crassidens* (Owens, 1846). Säugetierkunde Mitt. 17:351–356.

Bürger, O.

1900. Reisen eines Naturforschers im Tropischen Südamerika. Dieterichsche Verlagsbuchhandling Theodor Weicher, Leipzig, 395 p.

Caballero, L.A.

1992. El agua del Orinoco y sus toninas. Caza y Pesca 38(350):74.

Cagnolaro, L., and G. Notarbartolo di Sciara.

1979. Su di uno scheletro di *Balaenoptera edeni* Anderson, 1878 spiaggiato sulle coste caraibiche del Venezuela (Cetacea Balaenopteridae). Natura (Milano) 70(4):265–274.

Caldwell, D. K.

1964. A new record for the beaked whale, *Mesoplodon europaeus*, from Jamaica. Caribb. J. Sci. 4:547.

Caldwell, D. K., and M. C. Caldwell.

1966. Observations on the distribution, coloration, behavior and audible sound production of the spotted dolphin, *Stenella plagiodon* (Cope). Los Angeles Co. Mus. Contrib. Sci. 104:1–28.

1971a. The pygmy killer whale, *Feresa attenuata*, in the Western Atlantic, with a summary of world records. J. Mammal. 52(1): 206–209.

1971b. Porpoise fisheries in the Southern Caribbean—present utilizations and future potentials. *In* J. B. Higman (ed.), Proceedings of the 23rd Annual Session of the Gulf and Caribbean Fisheries Institute, p. 195–206. Coral Gables, FL: University of Miami, Rosenstiel School of Marine and Atmospheric Sciences, 212 p.

1975. Dolphin and small whale fisheries of the Caribbean and West Indies: Occurrence, history, and catch statistics -with special reference to the Lesser Antillean island of St. Vincent. J. Fish. Res. Board Canada 32(7):1105–1110.

1989. Pygmy sperm whale *Kogia breviceps* (de Blainville, 1838): Dwarf sperm whale *Kogia simus* Owen, 1866, *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 4, p. 235–260. Acad. Press, London, 430 p.

Caldwell, D. K., and D. S. Erdman.

1963. The pilot whale in the West Indies. J. Mammal. 44(1): 113–115.

Caldwell, D. K., W. F. Rathjen, and M. C. Caldwell.

1970. Pilot whales mass stranded at Nevis, West Indies. Quart. J. Florida Acad. Sci. 33(4):241–243.

Caldwell, D. K., M. C. Caldwell, W. F. Rathjen, and J. R. Sullivan.

1971a. Cetaceans from the Lesser Antillean island of St. Vincent. Fish. Bull. 69(2):303–312.

Caldwell, D. K., W. F. Rathjen, and M. C. Caldwell.

1971b. Cuvier's beaked whale, *Ziphius cavirostris*, from Barbados. Bull. South. Calif. Acad. Sci. 70:52–52.

Caldwell, D. K., M. C. Caldwell, and G. Arrindell.

1973. Dwarf sperm whales, *Kogia simus*, from the Lesser Antillean island of St. Vincent. J. Mammal. 54(2):515–517.

Caldwell, D. K., M. C. Caldwell, and R.V. Walker.

1976. First records for Fraser's dolphin (*Lagenodelphis hosei*) in the Atlantic and the melon-headed whale (*Peponocephala electra*) in the western Atlantic. Cetology 25:1–4.

Caldwell, M. C., D. K. Caldwell, and R. L. Brill.

1989. *Inia geoffrensis* in captivity in the United Sates. *In*, W. F. Perrin, R.L. Brownell Jr., Z. Kaiya, and L. Jiankag (eds.), Biology and conservation of the river dolphins, p. 35–41. IUCN Special Survival Commission Occ. Pap. 5, Gland, Switzerland.

Carr, T., and R. K. Bonde.

2000. Tucuxi (*Sotalia fluviatilis*) occurs in Nicaragua, 800 km north of its previously known range. Mar. Mammal Sci. 16(2):447–452.

Casinos, A.

1981. *Ziphius cavirostris* G. Cuvier, 1823 (Cetacea, Hyperoodontidae) en Isla de Margarita (Venezuela). Publ. Dept. Zool., Barcelona 6:61–63.

1986. La fauna de cetáceos del Caribe Sudoriental. *In* H. P. Castelló (ed.), Primera Reunión de Trabajo de Expertos en Mamíferos Acuáticos de América del Sur. Actas. 25 al 29 de Junio de 1984. Buenos Aires, Argentina, p. 42–55. Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", 247 p.

Casinos, A., and J. Bou.

1980. On a massive stranding of short-finned pilot whale, *Globicephala macrorhynchus* Gray, 1846, on Margarita Island (Venezuela). Sci. Rep. Whales Res. Inst. (32):145–148.

Casinos, A., and J. Ocaña.

1979. A craniometrical study of the gnus (sic) *Inia* d'Orbigny, 1834 (Cetacea, Platanistoidea). Säug. Mitt. 27:194–206.

Casinos, A., F. Bisbal, and S. Boher.

1981. Sobre tres ejemplares de *Sotalia fluviatilis* del lago de Maracaibo (Venezuela) (Cetacea, Delphinidae). Publ. Dept. Zool. Barcelona 7:93–96.

Castellanos, H. G., and A. Casinos.

1982. Un varamiento de *Pseudorca crassidens* (Owen, 1846) en la costa continental venezolana (Cetacea, Delphinidae). Publ. Dept. Zool., Barcelona 7:91–96.

Cervigón, F., and E. Velázquez.

1981. Nombres vernáculos de organismos marinos del estado de Nueva Esparta. Ed. Arte, Caracas, 52 p.

Chaffanjon, J.

1889. L'Orénoque et le Caura; relation de Voyages executes en 1886 et 1887. Hachette and Cie, Paris, 351 p.

CITES.

1992. Appendices I, II and III to the Convention on International Trade in Endangered Species (CITES) of wild fauna and flora. Dep. Int., U.S. Fish Wildlife Serv., 22 p.

Clark, A. H.

1887. The whale-fishery. 1. History and present condition of the fishery. *In* G. B. Goode (ed.). The fisheries and fishery industries of the United States, sect. V, vol. II, History and methods of the fisheries. U.S. GPO, 881 p.

Codazzi, A.

1841 (1940). Resumen de la geografía de Venezuela. Biblioteca Venezolana de Cultura, Tomo I, Caracas, 302 p.

Collet, A.

1984. Live-capture of cetaceans for European institutions. Rep. int. Whal. Comm. 34:603–607.

Columbus, C.

1498 (1986). Colón y el Viaje Tercero. Pando Ediciones, Madrid, 284 p.

Cuervo Díaz A., J. Hernández Camacho, and A. Cadena G.

1986. Lista actualizada de los mamíferos de Colombia. Anotaciones sobre su distribución. Caldasia 15(71–75):471–501.

Cummings, W. C.

1985. Bryde's whale *Balaenoptera edeni* Anderson, 1878. *In* S. H.

Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 3, p. 137–154. Acad. Press, London, 362 p.

Cuní, L. A.
1918. Contribución al estudio de mamíferos acuáticos observados en las costas de Cuba. Mem. Soc. Cubana Hist. Nat. Felipe Poey 3:83–123.

da Silva, V. M. F., and R. C. Best.
1994. Tucuxi *Sotalia fluviatilis* (Gervais, 1853). *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 43–69. Acad. Press, London, 416 p.

Dahlheim, M. E., and J. E. Heyning.
1999. Killer whale *Orcinus orca* (Linnaeus, 1758). *In* S. H. Ridgway and R. Harrison (eds.), Handbook of marine mammals, vol. 6. The second book of dolphins and the porpoises, p. 281–322. Acad. Press, San Diego, 486 p.

de Blainville, H.-M.
1817. *Delphinus geoffrensis*. *In* A.G. Desmaret (ed.), Nouveau Dictionnaire d'Histoire Naturelle, p. 151–152. Déterville, Paris.

Debrot, A. O.
1998. New cetacean records for Curaçao, Netherlands Antilles. Carib. J. Sci. 34(1–2):168–170.

Debrot, A. O., and N. B. Barros.
1992. Notes on a gervais beaked whale, *Mesoplodon europaeus*, and a dwarf sperm whale, *Kogia simus*, stranded in Curaçao, Netherlands Antilles. Mar. Mammal Sci. 8(2):172–178.
1994. Additional cetacean records for the Leeward Dutch Antilles. Mar. Mammal Sci. 10(3):359–368.

Debrot, A. O., J. A. de Meyer, and P. J. E. Dezentjé.
1998. Additional records and a review of the cetacean fauna of the Leeward Dutch Antilles. Caribb. J. Sci. 34(3–4):204–210.

de Carvajal, J.
1648a (1985). Descubrimiento del Río Apure. Historia 16, Madrid, 254 p.
1648b. Relación del descubrimento del Río Apure hasta su ingreso en el Orinoco. Hermanos Garcia Noblejas, Madrid, Spain, 306 p.

De la Torre, C.
1887. Un cetáceo. Habana, Cuba. An. Acad. Cienc. Med. Fís. Nat. Habana 32:431–433.
1907. El cachalote—*Catodon macrocephalus*. Anales Acad. Cienc. Med. Fís. Nat. Habana 43:368–372.

d'Orbigny, A.
1834. Notice sur un nouveau genre de Cétacé, des rivières du centre de l'Amerique meridionale. Nouvelles Annales du Museum d'Histoire Naturelle 3:28–38.

Diamond, J. M.
1988 Red books or green lists? Nature 332:304–305.

Díaz, J. C., L. García, and T. Cabrera.
1995. Cetaceans stranded in the Nueva Esparta State (Margarita, Coche and Cubagua Islands), Northeastern Venezuela, between June 1994 and July 1995. *In* Abstracts, Eleventh Biennal Conference on the Biology of Marine Mammals (Society of Marine Mammalogy), Orlando, FL, December 1995, p. 31.

Duarte Leal, M. A.
1991. Contribución al conocimiento de la fauna de mamíferos del Estado Zulia. Masters thesis, Universidad del Zulia, Facultad de Ciencias, Maracaibo, 126 p.

Erdman, D. S.
1961. New fish records and one whale record from Puerto Rico. Caribb. J. Sci. 1(2):39–40.
1962. Stranding of a beaked whale, *Ziphius cavirostris*, on the south coast of Puerto Rico. J. Mammal. 43:276–277.
1970. Marine mammals from Puerto Rico to Antigua. J. Mammal. 51(3):636–639.

Erdman, D. S., J. Harms, and M. M. Flores.
1973. Cetacean records from the northeastern Caribbean region. Cetology (17):1–14.

Ernst, A.
1868. Sobre los mamíferos de Venezuela mencionados por codazzi en su resumen de la geografía de Venezuela. Vargasia (1868):33–36. Reprinted, p. 132–135, *In* Adolfo Ernst (ed.), Obras Completas, vol. V, Zoología. Ediciones de la Presidencia de la República, Caracas, 368 p.
1877. Idea general de la fauna de Venezuela. Primer anuario estadístico de Venezuela, Caracas 1877, p. 274–292. Reprinted, p. 3–21, *In* Adolfo Ernst (ed.), Obras Completas, vol. V, Zoología. Ediciones de la Presidencia de la República, Caracas, 368 p.
1884. La Exposición Nacional de Venezuela en 1883. Grupo III: Productos Animales Clases 5a., 6a. y 9na., p. 302–308, 344. *In* Adolfo Ernst (ed.), Obras Completas, vol. III. Caracas: Ediciones de la Presidencia de la República, 706 p.
1886. On some interesting cases of migrations of marine fishes, on the coast of Venezuela at Carúpano, Nature 33:321–322.
1891. Idea general de la fauna de Venezuela. Boletín Ministerio de Obras Públicas, Caracas 1891 (81–100). Reprinted, p. 22–74, *In* Adolfo Ernst (ed.), Obras Completas, vol. V, Zoología. Ediciones de la Presidencia de la República, Caracas, 368 p.

Evans, P. G. H.
1980. Cetaceans in British waters. Mamm. Rev. 10(1):1–52.

Evans, W. E.
1994. Common dolphin, white-bellied porpoise *Delphinus delphis* Linnaeus, 1758. *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 191–224. Acad. Press, London, 416 p.

Evans, W. E., J. R. Jehl Jr., and F. H. Wolfon.
1979. Current studies on distribution and abundance of cetaceans in Venezuela. Rep. Int. Whal. Comm., working pap. 13:1–6.

Fenger, F. A.
1958. Alone in the Caribbean. Wellington Books, Belmont, MA, 353 p.

Fiedler, R. H., J. Lobell, and C. R. Lucas.
1947. The fisheries and fishery resources of the Caribbean area (a report of the Caribbean Fishery Mission of 1942). Dept. Int., Fish Wildl. Serv. Leafl. 259, 210 p.

Flores, C.
1977. Recursos acuáticos. Instituto Oceanográfico, Universidad de Oriente, Cumaná, Venezuela, 411 p.

Fraser, F. C.
1955. A skull of *Mesoplodon gervaisi* (Deslongchamps) from Trinidad, West Indies. Ann. Mag. Nat. Hist. 8(92):624–630.

Gambell, R.
1985a. Sei whale *Balaenoptera borealis* Lesson, 1828. *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 3, p. 155–170. Acad. Press, London, 362 p.
1985b. Fin whale *Balaenoptera physalus* (Linnaeus, 1758). *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 3, p. 171–192. Acad. Press, London, 362 p.

García, L., J. C. Díaz, and T. Cabrera.
1995. Notes on one specimen of *Delphinus delphis* (CETACEA: DELPHINIDAE) from a massive stranding ocurred on Laguna de Raya, Margarita Island, Venezuela. *In* Abstracts, Eleventh Biennal Conference on the Biology of Marine Mammals (Society of Marine Mammalogy), Orlando, FL, December 1995, p. 41.

Gewalt, W.
1978. Unsere Tonina (*Inia geoffrensis* Blainville 1817) - Expedition 1975. Zool. Garten N.F. Jena 48(5/6):323–384.

Gilij, F. S.
1780. Saggio di storia americana. Per Luigi Perego, Rome, 4 vol.

1782 (1965). Ensayo de historia Americana o sea historia natural, civil y sacra de los reinos y de las provincias Españolas de tierra pirme en la América meridional, Rome. (Reprinted by Academia Nacional de la Historia, Caraca,: 3 vols.).

Gómez Gaspar, A.
1996. Causas de la fertilidad marina en el nororiente de Venezuela. Interciencia 21(3):140–146.

Gosse, P. H.
1851. A naturalist's sojourn in Jamaica. Longman, Brown, Green and Longmans, London, 508 p.

Green, S., and K. Minkowski.
1977. The lion-tailed monkey and its South Indian rain forest habitat. *In* G. H. Bourne and H. S. H. Rainier (eds.), Primate conservation. Acad. Press, NY, p. 289–337.

Gremone, C.
1979a. Informe. Viaje a Puerto La Cruz, relacionado con investigación de cetáceos. Caracas. División de Auditoría de Permisos. MARNR, 11-7-79, 3 p.
1979b. Presencia de Mamíferos Marinos en Aguas Territoriales de Venezuela. Programa de Fauna, Dirección de Mejoramiento y Control, MARNR i–ii, 4 p.
1979c. Informe. Marcaje de Ballenas (*Balaenoptera edeni*). División de Auditorías de Permisos, MARNR, Informe Interno, 3 p.

Gricks, N.
1994. Whale-watching in the West Indies. St. Johns, Antigua, 40 p.

Handley, Jr., C. O.
1976. Mammals of the Smithsonian Venezuelan Project. Brigham Young Univ. Sci. Bull., Biol. Ser. 20(5):1–89.

Harrison, R. J., and R. L. Brownell Jr.
1971. The gonads of the South American dolphins, *Inia geoffrensis*, *Pontoporia blainvillei*, and *Sotalia fluviatilis*. J. Mammal. 52(2):413–419.

Hershkovitz, P.
1963. Notes on South American dolphins of the genera *Inia*, *Sotalia*, and *Tursiops*. J. Mammal. 44(1):98–103.
1966. Catalog of living whales. Bull. U.S. Natl. Mus. (246):1–259.

Heyning, J. E.
1989. Cuvier's beaked whale *Ziphius cavirostris* G. Cuvier, 1823. *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 4, p. 289–308. Acad. Press, London, 430 p.
1995. Sperm whales are odontocetes; analysis of the morphological evidence. *In* Abstracts, Eleventh Biennial Conference on the Biology of Marine Mammals, 14–18 December 1995, Orlando, FL, p. 54.

Hickling, C. F.
1950. The fisheries of the British West Indies; report on a visit in 1949. Development and welfare in the West Indies, Bull. 29, 41 p.

Holthuis, L. B.
1987. The scientific name of the sperm whale. Mar. Mammal Sci. 3(1):87–90.

Hoyt, E.
1984. The whale watcher's handbook. Doubleday and Co., Inc., Garden City, NY, 204 p.

Hudnall, J.
1978. A report on the general behavior of humpback whales near Hawaii, and the need for the creation of a whale park. Oceans 11(2):8–15.

Husson, A. M.
1978. The mammals of Suriname. E. J. Brill, Leiden, 569 p.

Husson, A. M., and L. B. Holthuis.
1974. *Physeter macrocephalus*, Linnaeus 1758, the valid name for the sperm whale. Zool. Mededel. 48(19):205–217.

ICZN (International Commission for Zoological Nomenclature).
1991. Opinion 1660. *Steno attenuatus* Gray, 1846 (currently *Stenella attenuata*; Mammalia, Cetacea): specific name conserved. Bull. Zool. Nomencl. 48(3):277–278.

Jácome, J. C.
1989. Mochima, encuentro entre mar y tierra. Banco Provincial, Cromotip, Caracas, 200 p.

Jefferson, T. A., and S. K. Lynn.
1994. Marine mammal sightings in the Caribbean Sea and Gulf of Mexico, summer 1991. Caribb. J. Sci. 30(1–2):83–89.

Jefferson, T. A., and A. J. Schiro.
1997. Distribution of cetaceans in the offshore Gulf of Mexico. Mammal Rev. 27(1):27–50.

Jefferson, T. A., S. Leatherwood, and M. A. Webber.
1993. Marine mammals of the world. FAO, Rome, 587 p.

Jonsgård, A.
1959. New find of sword from swordfish (*Xiphias gladius*) in blue whale (*Balaenoptera musculus*) in Antarctic. The Norwegian Whaling Gazette (7):352–360.

Kasuya, T.
1973. Systematic consideration of recent toothed whales based on the morphology of tympano-periotic bone. Sci. Rep. Whales Res. Inst. (25):1–103.

Kasuya, T., and T. Kajihara.
1974. Ecology of dolphins in the Amazon and Orinoco systems. *In* Report of the Scientific Expedition on the La Plata and Amazon Dolphins, Univ. Tokyo Expedition on river dolphins, p. 7–11. Univ. Tokyo.

Klinowska, M.
1991. Dolphins, porpoises and whales of the world. The IUCN Red Data Book. IUCN, 429 p.

Kruse, S., D. K. Caldwell, and M. C. Caldwell.
1999. Risso's dolphin *Grampus griseus* (G. Cuvier, 1812). *In* S. H. Ridgway and R. Harrison (eds.), Handbook of marine mammals, vol. 6. The second book of dolphins and the porpoises, p. 183–212. Acad. Press, San Diego, 486 p.

Leatherwood, S., and R. R. Reeves.
1983. The Sierra Club handbook of whales and dolphins. Sierra Club Books, San Francisco, 302 p.

Leatherwood, S., D. K. Caldwell, and H.E. Winn.
1976. Whales, dolphins, and porpoises of the Western North Atlantic. A guide to their identification. NOAA Tech. Rep. NMFS Circ. 396, 176 p.

Leatherwood, S., R. R. Reeves, W. F. Perrin, and W. E. Evans.
1982. Whales, dolphins, and porpoises of the eastern North Pacific and adjacent arctic waters. A guide to their identification. NOAA Tech. Rep. NMFS Circ. 444, 245 p.

LeDuc, R. G., W. F. Perrin, A. O. Debrot, N. B. Barros, and P. J. H. Van Bree.
1997. *Stenella attenuata* from Curacao misidentified as *S. coeruleo alba*. Mar. Mammal Sci. 13(2):356–357.

León, H., and C. G. Aguayo.
1945. Excursión Botánica a la bahía de Nuevas Grandes y hallazgo de una especie de cachalote nueva para la fauna cubana. Contrib. Ocas. Mus. Hist. Nat. Colegio La Salle (5):1–7.

Lewis, C. B.
1954. Whales in Jamaican waters. Nat. Hist. Notes (Nat. Hist. Soc. Jamaica) 65:75.

Lindeman, M.
1880. Die Seefischereien, ihre Bebiete, Betrieb und Erträge in den Jahren, 1869–1878. (Ergänzungsheft No. 60 zu "Petermann's Mittheilungen"). Justus Perthes, Gotha, 95 p.

Lira, C., J. Bolaños, and E. Mondolfi.
1995. On two strandings of fin whale (*Balaenoptera physalus*) and its presence in Venezuelan waters. *In* Abstracts, Eleventh Biennal Conference on the Biology of Marine Mammals, 14–18 December 1995, Orlando, FL., p. 69.

Magnusson, W. E., R. C. Best, and V. M. F. da Silva.
1980. Numbers and behaviour of Amazonian dolphins, *Inia geoffrensis* and *Sotalia fluviatilis fluviatilis*, in the Rio Solimões, Brasil. Aquat. Mamm. 8(1):27–32.
Maraven.
1986. Rescate en el Infierno (video). Maraven, Caracas.
McGuire, T. L., and K. O. Winemiller.
1998. Occurrence, patterns, habitat associations, and potential prey of the river dolphin, *Inia geoffrensis*, in the Cinaruco River, Venezuela. Biotropica 30(4):625–638.
Mead, J. G.
1977. Records of sei and Bryde's whales from the Atlantic coast of the United States, the Gulf of Mexico, and the Caribbean. Rep. Int. Whal. Comm. Spec. Iss. 1:113–116.
1989. Beaked whales of the genus *Mesoplodon*. *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 4, p. 349–430. Acad. Press, London, 430 p.
Mead, J. G., and R. L. Brownell.
1993. Order Cetacea. *In* D. E. Wilson and D. M. Reeder (eds.), Mammal species of the world. A taxonomic and geographic reference, p. 349–364. Smithsonian Institution Press, 1, 206 p.
Meade, R. H., and L. Koehnken.
1991. Distribution of the river dolphin, tonina *Inia geoffrensis*, in the Orinoco river basin of Venezuela and Colombia. Interciencia 16(6):300–312.
Mignucci-Giannoni, A. A., E. P. Hoberg, D. Siegel-Causey, and E. H. Williams Jr.
1998a. Metazoan parasites and other symbionts of cetaceans in the Caribbean. J. Parasitol. 84(5):939–946.
Mignucci-Giannoni, A. A., M. A. Rodriguez-Lopez, J. J. Pérez-Zayas, R. A. Montoya-Ospina, and E. H. Williams Jr.
1998b. First record of the melonhead whale (*Peponocephala electra*) for Puerto Rico. Mammalia 62(3):452–457.
Mignucci-Giannoni, A. A., R. A. Montoya-Ospina, J. J. Pérez-Zayas, M. A. Rodriguez-Lopez, and E. H. Williams Jr.
1999. New records of Fraser's dolphins (*Lagenodelphis hosei*) for the Caribbean. Aquatic Mammals 25(1):15–19.
Miller G. S., Jr.
1921. American records of whales of the genus *Pseudorca*. Proc. U.S. Natl. Mus. 57(2311):205–207.
Mills, L. R., and K. R. Rademacher.
1996. Atlantic spotted dolphins (*Stenella frontalis*) in the Gulf of Mexico. Gulf of Mexico Sci. 14:114–120.
Mitchell, C.
1965. Finisterre sails the Windward Islands. Natl. Geogr. Mag. 128(6):755–801.
Mitchell, E.
1970. Pigmentation pattern evolution in delphinid cetaceans: an essay in adaptive coloration. Can. J. Zool. 48(4):717–740.
Mitchell, E., and D. G. Chapman.
1977. Preliminary assessment of stocks of northwest Atlantic sei whale (*Balaenoptera borealis*). Rep. Int. Whal. Comm. Spec. Iss. 1:117–120.
Mitchell, E., and R. R. Reeves.
1983. Catch history, abundance, and present status of northwest Atlantic humpback whales. Rep. Int. Whal. Comm. (Spec. Iss. 5):153–212.
Mitchell, E. D.
1974. Present status of northwest Atlantic fin and other whale stocks. *In* W. E. Schevill (ed.), The whale problem, p. 108–169. Harvard University Press, Cambridge, MA, 419 p.
1975. Porpoise, dolphin and small whale fisheries of the world. IUCN. Monograph No. 3, Morges, Switzerland.
Miyazaki, N., and W. F. Perrin.
1994. Rough-toothed dolphin *Steno bredanensis* (Lesson, 1828). *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 1–21. Acad. Press, London, 416 p.
Monente, J. A.
1997. Phenomena contributing to the periodic enrichment of Caribbean waters. Interciencia 22(1):24–27.
Moore, J. C.
1968. Relationships among the living genera of beaked whales with classifications, diagnoses and keys. Fieldiana Zool. 53(4): 209–298.
Morales Vela, B., and L. D. Olivera Gómez.
1993. Varamiento de calderones *Globicephala macrorhynchus* (Cetacea: Delphinidae) en la Isla de Cozumel, Quintana Roo, México. Anales Inst. Biol. Univ. Nac. Autón. México Ser. Zool. 64(2):177–180.
Morice, J.
1958. Animaux marins comestibles des Antilles Françaises. Rev. Trav. Inst. Pêches Marit. 22(1):85–104.
Mozans, H. J.
1910. Up the Orinoco and down the Magdalena. D. Appleton and Co., New York, 439 p.
Mullin, K. D., L. J. Hansen, W. Hoggard, and T. A. Jefferson.
1994a. First sightings of melon-headed whales (*Peponocephala electra*) in the Gulf of Mexico. Mar. Mammal Sci. 10(3):342–348.
Mullin, K. D., L. V. Higgins, T. A. Jefferson, and L. J. Hansen.
1994b. Sightings of the clymene dolphin (*Stenella clymene*) in the Gulf of Mexico. Mar. Mammal Sci. 10(4):464–470.
Mullin, K. D., W. Hoggard, C. L. Roden, R. R. Lohoefener, C. M. Rogers, and B. Taggart.
1994c. Cetaceans on the upper continental slope in the north-central Gulf off Mexico. Fish. Bull. 92(4):773–786.
Muñoz-Hincapié, M. F., D. M. Mora-Pinto, D. M. Palacios, E. R. Secchi, and A. A. Mignucci-Giannoni.
1998. First osteological record of the dwarf sperm whale in Colombia, with notes on the zoogeography of *Kogia* in South America. Rev. Acad. Colomb. Cienc. 22(84):433–444.
Nico, L.G., and D.C. Taphorn.
1994. Mercury in fish from gold mining regions in the Upper Cuyuní river system, Venezuela. Fresenius Envir. Bull. 3:287–292.
Northridge, S. P.
1984. World review of interactions between marine mammals and fisheries. FAO Fisheries Technical Paper #251, 190 p.
Notarbartolo di Sciara, G.
1983. Bryde's whale (*Balaenoptera edeni* Anderson, 1878) off Eastern Venezuela (Cetacea, Balaenopteridae). Hubbs-Sea World Research Inst. Tech. Rep. 83-153, 16 p.
Odell, D. K., and K. M. McClune.
1999. False killer whale *Pseudorca crassidens* (Owen, 1846). *In* S. H. Ridgway and R. Harrison (eds.), Handbook of marine mammals, vol. 6. The second book of dolphins and the porpoises, p. 213–243. Acad. Press, San Diego, 486 p.
O'Hanlon, R.
1988. In trouble again: A journey between the Orinoco and the Amazon. The Atlantic Monthly Press, 272 p.
Osgood, W. H.
1912. Mammals from western Venezuela and eastern Colombia. Field Mus. Nat. Hist. Publ. Zool. 10(5):33–66.
Ostenrath, F.
1976. Some remarks on therapy of mycotic and bacteriological skin diseases in freshwater dolphins *Inia geoffrensis*. Aquat. Mamm. 4:49–55.
O'Sullivan, S., and K. D. Mullin.
1997. Killer whales (*Orcinus orca*) in the northern Gulf of Mexico. Mar. Mammal Sci. 13(1):141–147.
Palacios, D. M., P. Rodriguez, B. J. Brennan, S. Beltrán, and F. Trujillo.
1996. Cetacean sightings during cruises in the Southwestern Caribbean Sea. 7ma. Reunión de Trabajo de Especialistas

en Mamíferos Acuáticos de América del Sur. Programas y Resúmenes. 22–25 Octubre 1996, Viña del Mar, Chile, p 76.

Paolillo, A., and A. Romero.
1989. Los relatos de la fauna orinoquense hechos por Felipe Salvador Gilij, evaluados con la óptica de la zoología del Siglo XX. Revista Montalbán (21):159–178.

Perkins, J. S., and G. W. Miller.
1983. Mass stranding of *Steno bredanensis* in Belize. Biotropica 15(3):235–236.

Perrin, W. F.
1990a. *Steno attenuatus* Gray, 1846 (currently *Stenella attenuata*; Mammalia, Cetacea): proposed conservation of the specific name. Bull. Zool. Nomencl. 47(1):32–37.
1990b. Subspecies of *Stenella longirostris* (MAMMALIA: CETACEA: DELPHINIDAE). Proc. Biol. Soc. Wash. 103(2):453–463.

Perrin, W. F., and R. L. Brownell Jr.
1989. Report of the workshop (Proceedings of the Workshop on Biology and Conservation of Platanistoid Dolphins). *In* W. F. Perrin, R. L. Brownell, K. Zhou, and J. Liu (eds.), Biology and conservation of the river dolphins, p. 1–21. IUCN Species Survival Comm. Occas. Pap. 3.

Perrin, W. F., and J. W. Gilpatrick.
1994. Spinner dolphin *Stenella longirostris* (Gray, 1828). *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 99–128. Acad. Press, London, 416 p.

Perrin, W. F., and A. A. Hohn.
1994. Pantropical spotted dolphin *Stenella attenuata*. *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 71–98. Acad. Press, London, 416 p.

Perrin, W. F., and J. G. Mead.
1994. Clymene dolphin *Stenella clymene* (Gray, 1846). *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 161–171. Acad. Press, London, 416 p.

Perrin, W. F., E. D. Mitchell, J. G. Mead, D. K. Caldwell, and P. J. H. van Bree.
1981. *Stenella clymene*, a rediscovered tropical dolphin of the Atlantic. J. Mammal. 62(3):583–598.

Perrin, W. F., E. D. Mitchell, J. G. Mead, D. K. Caldwell, M. C. Caldwell, P. J. H. van Bree, and W. H. Dawbin.
1987. Revision of the spotted dolphins, *Stenella* spp. Mar. Mammal Sci. 3(2):99–170.

Perrin, W. F., D. K. Caldwell, and M. C. Caldwell.
1994a. Atlantic spotted dolphin *Stenella frontalis* (G. Cuvier, 1829). *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 173–190. Acad. Press, London, 416 p.

Perrin, W. F., G. P. Donovan, and J. Barlow.
1994b. Annex G. List of cetacean species. *In* W. F. Perrin, G. P. Donovan, and J. Barlow (eds.), Gillnets and cetaceans, p. 70–71. Intl.Whal. Comm., Spec. Iss. 15, 629 p.

Perrin, W. F., S. Leatherwood, and A. Collet.
1994c. Fraser's dolphin *Lagenodelphis hosei* Fraser, 1956. *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 225–240. Acad. Press, London, 416 p.

Perrin, W. F., C. E. Wilson, and F. I. Archer II.
1994d. Striped dolphin *Stenella coeruleoalba* (Meyen, 1833). *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 129–159. Acad. Press, London, 416 p.

Perryman, W. L., D. W. K. Au, S. Leatherwood, and T. A. Jefferson.
1994. Melon-headed whale *Peponocephala electra* Gray, 1846. *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, p. 363–386. Acad. Press, London, 416 p.

Pilleri, G.
1979. Observations on the ecology of *Inia geoffrensis* from the Rio Apure, Venezuela. Invest. Cetacea 10:137–143.

Pilleri, G., and M. Gihr.
1977. Observations on the Bolivian (*Inia boliviensis* d'ORBIGNY, 1834) and the Amazonian bufeo (*Inia geoffrensis* de BLAINVILLE, 1817) with description of a new subspecies (*Inia geoffrensis humboldtiana*). Invest. Cetacea 8:11–76.
1980. Additional considerations on the taxonomy of the genus *Inia*. Invest. Cetacea 12:15–24.

Pilleri, G., and O. Pilleri.
1982. Zoologische Expedition zum Orinoco und Brazo Casiquiare 1981. Bern: Hirnanatomisches Institut der Universität Bern (Schweiz), 154 p.

Pilleri, G., G. Marcuzzi, and O. Pilleri.
1982. Speciation in the Platanistoidea. Systematic, zoogeographical, and ecological observations on recent species. Invest. Cetacea 10:137–143.

Pilleri, G., K. Zbinden, and C. Kraus.
1979. The sonar field of *Inia geoffrensis*. Invest. Cetacea 10:157–176.

Price, W. S.
1985. Whaling in the Caribbean: Historical perspective and update. Rep. Intl. Whal. Comm. 35:413–420.

Prieto, M.A.
1977. Entre delfines. Caza Pesca Náutica Internacional. 24(178): 18–19.

Prieto Rodríguez, M.
1988. Reporte de algunos cetáceos del Caribe Colombiano. Bol. Fac. Biol. Mar. (Univ. Jorge Tadeo Lozano, Bogotá) (8):30–40.

Rankin, J. J.
1953. First record of the rare beaked whale, *Mesoplodon europaeus*, Gervais, from the West Indies. Nature 172:873–874.
1954. An interesting whale. Nat. Hist. Notes (Nat Hist. Soc. Jamaica) 6(64):51–54.
1955. A rare whale in tropical seas. Everglades Nat. Hist. 3:24–31.
1956. The structure of the skull of the beaked whale, *Mesoplodon gervaisi* Deslongchamps. J. Morph. 99(2):329–357.

Rathjen, W. F., and J. R. Sullivan.
1970. West Indies whaling. Sea Frontiers 16(3):130–137.

Reeves, R. R.
1988. Exploitation of cetaceans in St. Lucia, Lesser Antilles, January 1987. Rep. Int. Whal. Comm. 38:445–447.

Reeves, R. R., and S. Leatherwood.
1994. Dams and river dolphins: Can they co-exist? Ambio 23(3):172–175.

Reeves, R. R., and E. Mitchell.
1988. Killer whale sightings and takes by American pelagic whalers in the North Atlantic. J. Mar. Res. Inst. Reyjavik 11:7–23.

Rice, D. W.
1977. A list of the marine mammals of the world, 3rd. ed. NOAA Tech. Rept. NMFS SSRF 711, 15 p.
1989. Sperm whale *Physeter macrocephalus* Linnaeus, 175., *In* S. H. Ridgway and R. J. Harrison (eds.)., Handbook of marine mammals, vol. 4, p. 177–233. Acad. Press, London, 441 p.
1998. Marine mammals of the world. Systematics and distribution. Soc. Marine Mammalogy, Lawrence, KS, 231 p.

Rizk, M.
1995. Ocho toneladas de peces envenenados en Apure. El Nacional, March 31, 1995, p. C/2.

Robins, C. R., R. M. Bailey, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott.
1991. Common and scientific names of fishes from the United States and Canada. American Fisheries Society Spec. Publ. 20, 183 p.

Rodríguez, E., R. Acosta, C. Pérez, T. Urdaneta, M. Parada, E. W. Cabezas, S. Fuenmayor, D. Arrieche, L. Gómez, J. Bong, A. L. Viloria, and M. A. Duarte.
1993. *Orcinus orca* (Linnaeus), 1758 (CETACEA : DELPHINI-

DAE) en la costa norte del Estado Zulia, Venezuela Anartia (4):1–8.

Rodríguez-López, M. A., and A. A. Mignucci-Giannoni.
1999. A stranded pygmy killer whale (*Feresa attenuata*) in Puerto Rico. Aquatic Mammals 25(2):119–121.

Romero, A.
1990. Iniciativas de manejo costero en Venezuela, *In* El Manejo de Ambientes y Recursos Costeros en América Latina y el Caribe, p. 203–224. Senado de la Nación Argentina, Buenos Aires, vol. 1, 269 p.
1992a. Auditoría Ambiental de Venezuela 1991. Un reporte sobre la situación ecológica de Venezuela hasta el 31 de Diciembre de 1991. BIOMA, Caracas, 110 p.
1992b. Economic contributions of Venezuelan protected areas: The tragedy of the commons and perspective. *In* Síntesis de Talleres, IV Congreso Mundial de Parques Nacionales y Areas Protegidas, Caracas Venezuela, 10–21 de Febrero de 1992, p. 242–243, 328 p.

Romero, A., and I. Agudo.
1993. La situación de la conservación de cetáceos en Venezuela. Bioma y Fundacetácea, Caracas, 51 p.

Romero, A., A. I. Agudo, and S. J. Blondell de Agudo.
1997a. The scientific discovery of the Amazon River dolphin *Inia geoffrensis*. Mar. Mammal Sci. 13(3):419–426.

Romero, A, A. I. Agudo, and S. M. Green.
1997b. Exploitation of cetaceans in Venezuela. Rep. Int. Whal. Comm. 47:735–746.

Romero, A., A. I. Agudo, and C. Salazar.
2000. Whale shark records and conservation status in Venezuela. Biodiversity: The Journal of Life on Earth 3:11–15.

Romero, A., A. Mayayo, and I. Agudo.
1991. Los cetáceos recientes de Venezuela. Mem. Soc. Cienc. Nat. La Salle 51(135–136): 169–180.

Ross, G. J. B., and S. Leatherwood.
1994. Pygmy killer whale *Feresa attenuata* Gray, 1874. *In* S. H. Ridgway and R. J. Harrison (eds.), Handbook of marine mammals, vol. 5, , p. 387–404. Acad. Press, London, 416 p.

Sanoja, M.
1989. Origins of cultivation around the Gulf of Paria, Northeastern Venezuela. Natl. Geogr. Res. 5(4):446–458.

Scaramuzza, L. C.
1943. Captura de un cachalote en la costa sur de Cuba. Mèm. Soc. Cubana Hist. Nat. 17(2):141–142.

Schenkkan, E. J.
1977. Notes on the nasal tract complex of the boutu, *Inia geoffrensis* (De Blainville, 1817) (Cetacea, Platanistidae). Bijd. Dierk. 46:275–283.

Schevill, W. E.
1986. The international code of zoological nomenclature and a paradigm: The name *Physeter catodon* Linnaeus 1758. Mar. Mammal Sci. 2(2):153–157.

Schnapp, D., and J. Howroyd.
1990. Distribution and local range of the boto *Inia geoffrensis* in the Río Apure, Venezuela. *In* Proc. An. Conf. Eur. Cetacean Soc., Palma de Mallorca, Spain, 2–4 March, 1990, p. 125–127.
1992. Distribution and local range of Orinoco dolphin (*Inia geoffrensis*) in the Río Apure, Venezuela. Z. Säugetierkunde 57:313–315.

Simmonds, M. P., and L. F. López-Jurado.
1991. Whales and the military. Nature 315:448.

Simpson, G. G.
1945. The principles of classification and a classification of mammals. Bull. Amer. Mus. Nat. Hist. 85:1–350.

Slijper, E. J., W. L. van Utrecht, and C. Naaktgeboren.
1964. Remarks on the distribution and migration of whales, based on observations from Netherlands ships. Bijdragen tot de Dierkunde 34:1–93.

Smith, T. D., J. Allen, P. J. Clapham, P. S. Hammond, S. Katona, F. Larsen, J. Lien, D. Mattila, P. J. Palsbøll, J. Sigurjónsson, P. T. Stevick, and N. Øilen.
1999. An ocean-basin-wide mark-recapture study of the North Atlantic humpback whale (*Megaptera novaeangliae*). Mar. Mammal Sci. 15(1):1–32.

Soot-Ryen, T.
1961. On a Bryde's whale stranded in Curaçao. Nor. Hvalfangst-Tid. 50(6):323–332.

Starkell, D.
1988. Paddle to the Amazon. Prima Publishing & Communications, Rocklin, CA, 319 p.

Sylvestre, J.-P.
1985. Some observations on behaviour of two orinoco dolphins (*Inia geoffrensis humboldtiana*, (Pilleri and Gihr 1977), in captivity, at Duisburg Zoo. Aq. Mammals 11(2):58–65.

Tami, A., P. Aponte, and M. García.
1987. Estudio preliminar de una manada de *Tursiops*, sp. ubicados temporalmente en Isla Pájaros, Parque Nacional Morrocoy. 37a. Convención Anual ASOVAC, Capítulo Zulia, Maracaibo 22–27 Nov. 1987, p. 92.

Taruski, A. G., and H. E. Winn.
1976. Winter sightings of odontocetes in the West Indies. Cetology 22:1–12.

Tello, J.
1979. Mamíferos de Venezuela. Fundación La Salle de Ciencias Naturales, Caracas, 192 p.

Townsend, C. H.
1935. The distribution of certain whales as shown by logbook records of American whale ships. Zoologica 19(1):1–50.

Trebbau, P.
1975. Measurements and some observations on the freshwater dolphin, *Inia geoffrensis*, in the Apure River, Venezuela. Zool. Garten N. F. Jena 45(3)153–167.

Trebbau, P., and P. J. H. van Bree.
1974. Notes concerning the freshwater dolphin *Inia geoffrensis* (de Blainville, 1817) in Venezuela. Z. Säugetierkunde 39:50–57.

True, F. W.
1889. Contributions to the natural history of the cetaceans. A review of the family delphinidae. Bull. U.S. Natl. Mus. 36: 1–191.

Truitt, D.
1974. Dolphins and porpoises: A comprehensive, annotated bibliography of the smaller cetacea. Gale Research Company, Detroit, MI, 582 p.

Turner, W.
1912. The marine mammals in the Anatomical Museum of the University of Edinburgh. MacMillan, London, 207 p.

van Bree, P. J. H.
1974. On the diagnosis of the South American dolphin *Sotalia fluviatilis* and its author. Z. Säugetierkunde 39:57–58.
1975. Preliminary list of the cetaceans of the Southern Caribbean. Stud. Fauna Curaçao Other Caribb. Islands (160):79–87.

van Bree, P. J. H., and I. Kristensen.
1974. On the intriguing stranding of four Cuvier's beaked whales, *Ziphius cavirostris* G. Cuvier, 1823, on the Lesser Antillean island of Bonaire. Bijdragen tot de Dierkunde 44(2): 235–238.

van Bree, P. J. H., and D. Robineau.
1973. Notes sur le holotypes de *Inia geoffrensis geoffrensis* (de Blainville, 1917) et de *Inia geoffrensis boliviensis* d'Orbigny, 1834 (Cetacea, Platanistidae). Mammalia 37(4):658–664.

van Bree, P. J. H., and P. Trebbau.
1973. Sobre algunas anomalías del esqueleto de la tonina de

agua dulce *Inia geoffrensis* (de Blainville, 1817) (Cetácea, Platanistidae). Bol. Acad. Cienc. Fís. Mat. Nat. 33(100):57–63.

van Bree, P. J. H., F. Creutzberg, and I. Kristensen.
1973. On strandings of Cuvier's whale, *Ziphius cavirostris* G. Cuvier, 1823, on the Lesser Antillean Islands of Sint Maarten and Curaçao. Lutra 15(1/3):6–8.

van Halewijn, R., and P. J. H. van Bree.
1972. On the occurrence of the common dolphin, *Delphinus delphis*, and the spinner dolphin, *Stenella longirostris*, off the coast of Venezuela. Investig. Cetacea 4:187–188.

Varona, L. S.
1964. Un Cráneo de *Ziphius cavirostris* del Sur de Isla de Pinos. Poeyana Ser A (4):1–3.
1965. *Balaenoptera borealis* LESSON (Mammalia: Cetacea) capturada en Cuba. Poeyana Ser. A (7):1–4.
1970. Morfología externa y caracteres craneales de un macho adulto de *Mesoplodon europaeus* (Cetacea: Ziphiidae). Poeyana Ser. A (69):1–17.
1974. Catálogo de los mamíferos vivientes y extinguidos de las Antillas. Academia de Ciencias de Cuba, La Habana, 139 p.

Vidal, O.
1990. Lista de los mamíferos acuáticos de Colombia. Informe del Museo del Mar (Universidad Tadeo Lozano, Bogotá, Colombia) 37:1–18.
1993. Aquatic mammal conservation in Latin America: Problems and perspectives. Conserv. Biol. 7(4):788–795.

Vila, M.-A.
1967. Aspectos geográficos de las dependencias federales. Corporación Venezolana de Fomento, Caracas, 113 p.

Villarroel, A. J., J. Bolaños, and A. Ferrer.
1998. Primer registro de la orca pigmea (*Feresa attenuata*) en aguas venezolanas y notas sobre su varamiento. *In* Programação-Resumos, 8o Reumião de Trabalhos de Especialistas em Mamíferos Aquáticos da América do Sul, Olinda, Brazil 25–29 Outubro 1998, p. 223.

von Humboldt, A.
1814 (1852). Personal narrative of travels to the equinoctial regions of America during the years 1799–1804. Henry G. Bohn, London, 3 vols. (translated by T. Ross).

Wallace, A. R.
1889. A narrative of travels on the Amazon and Rio Negro. Dover Publications, New York, 363 p.

Watkins, W. A.
1981. Reaction of three species of whales *Balaenoptera physalus*, *Megaptera novaeangliae*, and *Balaenoptera edeni* to implanted radio tags. Deep-Sea Res. 28A(6):589–599.

Watkins, W. A., and K. E. Moore.
1982. An underwater acoustic survey for sperm whales (*Physeter catodon*) and other cetaceans in the Southeast Caribbean. Cetology (46):1–7.

Watkins, W. A., M. A. Daher, K. M. Fristrup, T. J. Howald, and G. Notarbartolo di Sciara.
1993. Sperm whales tagged with transponders and tracked underwater by sonar. Mar. Mammal Sci. 9(1):55–67.

Watkins, W. A., M. A. Daher, K. M. Fristrup, and G. Notarbartolo i Sciara.
1994. Fishing and acoustic behavior of Fraser's dolphin (*Lagenodelphis hosei*) near Dominica, Southeast Caribbean. Caribb. J. Sci. 30(1–2):76–82.

Watkins, W. A., M. A. Daher, A. Samuels, and D. P. Gannon.
1997. Observations of *Peponocephala electra*, the melon-headed whale, in the southeastern Caribbean. Caribb. J. Sci. 33(1–2):34–40.

Weibezahn, F. H.
1994. Lake Guri (Venezuela): Preliminary limnological characterization of a large tropical blackwater reservoir. Int. Revue Ges. Hydrobiol. 79(1):47–60.

Wells, R. S., and M. D. Scott.
1999. Bottlenose dolphin *Tursiops truncatus* (Montagu, 1821). *In* S. H. Ridgway and R. Harrison (eds.), Handbook of marine mammals, vol. 6. The second book of dolphins and the porpoises, p. 137–182. Acad. Press, San Diego, 486 p.

Wilkinson, L., and M. Hill.
1994. SYSTAT for DOS: Using SYSTAT, 6th edition, SYSTAT, Inc., Evanston, IL, 871 p.

Winn, H. E., and N. E. Reichley.
1985. Humpback whale *Megaptera novaeangliae* (Borowski, 1781). Handbook of marine mammals, vol. 3, p. 241–273. Acad. Press, London, 362 p.

Winn, H. E., and L. K. Winn.
1978. The song of the humpback whale *Megaptera novaeangliae* in the West Indies. Mar. Biol. (Berlin) 47:97–114.

Winn, H. E., R. K. Edel, and A. G. Taruski.
1975. Population estimate of the humpback whale (*Megaptera novaeangliae*) in the West Indies by visual and acoustic techniques. J. Fish. Res. Board Can. 32:499–506.

Wood, F. G., D. K. Caldwell, and M. C. Caldwell.
1970. Behavioral interactions between porpoises and sharks. Invest. Cetacea 2:264–277.

Appendix 1

Institutions, alphabetically by abbreviation, and their locations.

Abbreviation	Institution	Location
AMNH	American Museum of Natural History	New York, NY, USA
ASOEVEFAS	Asociación de Estudiantes de Veterinaria por la Fauna Silvestre, Universidad del Zulia	Maracaibo, Venezuela
CAS	California Academy of Sciences	San Francisco, CA, USA
CN	Universitat Zoologisk Museum, Copenhagen	Copenhagen, Denmark
CVTLUZ	Colección de Vertebrados Terrestres, Centro de Biología, Facultad de Humanidades, Universidad del Zulia	Maracaibo, Zulia State, Venezuela
EBRG	Museo de la Estación Biológica de Rancho Grande	Maracay, Aragua State, Venezuela
EDM	E.D. Mitchell, private collection	
FMNH	Field Museum of Natural History	Chicago, IL, USA
IC	Israel Cañizales, private collection	Maracaibo, Venezuela
ICNB	Instituto de Ciencias Naturales de Bogotá	Bogotá, Colombia
LACM	Los Angeles County Museum	Los Angeles, CA, USA
LBCS	Laboratorio de Biología, Colegio Saleciano, Sarriá	Caracas, Venezuela
MBLUZ	Museo de Biología de la Universidad del Zulia	Maracaibo, Zulia State, Venezuela
MBUCV	Museo de Biología de la Universidad Central de Venezuela	Caracas, Venezuela
MCIBLUZ	Museo del Centro de Investigaciones Biológicas, Facultad de Humanidades y Educación, Universidad del Zulia	Maracaibo, Venezuela
MCIMAR	Museo del Centro de Investigaciones Marinas del la Universidad Experimental Francisco de Miranda	Coro, Venezuela
MCN or MCNC	Museo de Ciencias Naturales (d.b.a. Fundación Museo de Ciencias)	Caracas, Venezuela
MCNUSB	Museo de Ciencias Naturales de la Universidad Simón Bolívar	Caracas, Venezuela
MDMBR	Museo del Mar de Boca de Río, Universidad de Oriente	Boca del Río, Margarita, Venezuela
MDMCU	Museo del Mar	Cumaná, Venezuela
MEDIMAR	Museo de la Estación de Investigaciones Marinas de Margarita, Fundación La Salle	Punta de Piedras, Venezuela
MHNLS	Museo de Historia Natural La Salle	Caracas, Venezuela
USNM	United States National Museum	Washington, DC, USA
ZMA	Zoologisch Museum, University of Amsterdam	Amsterdam, Holland

NOAA Technical Reports NMFS

The major responsibilities of the National Marine Fisheries Service (NMFS) are to monitor and assess the abundance and geographic distribution of fishery resources, to understand and predict fluctuations in the quantity and distribution of these resources, and to establish levels for their optimum use. NMFS is also charged with the development and implementation of policies for managing national fishing grounds, with the development and enforcement of domestic fisheries regulations, with the surveillance of foreign fishing off U.S. coastal waters, and with the development and enforcement of international fishery agreements and policies. NMFS also assists the fishing industry through marketing services and economic analysis programs and through mortgage insurance and vessel construction subsidies. It collects, analyzes, and publishes statistics on various phases of the industry.

Recently Published Technical Reports

139. Seasonal, horizontal, and vertical distribution of phytoplankton chlorophyll a in the northeast U.S. continental shelf ecosystem, by John E. O'Reilly and Christine Zetlin. November 1998, 120 p.

140. Quantitative composition and distribution of the macrobenthic invertebrate fauna of the continental shelf ecosystems of the northeastern United States, by Roger B. Theroux and Roland L. Wigley. December 1998, 240 p.

141. Marine flora and fauna of the eastern United States. Anthozoa: Actiniaria, Corallimorpharia, Ceriantharia, and Zoanthidea, by Kenneth P. Sebens. December 1998, 68 p.

142. Biology and fisheries of swordfish, *Xiphias gladius*. Papers from the International Symposium on Pacific Swordfish, Ensenada, Mexico, 11-14 December 1994, edited by Izadore Barrett, Oscar Sosa-Nishizaki, and Norman Bartoo. December 1998, 276 p.

143. Characteristics and causes of Texas marine strandings, edited by Roger Zimmerman. December 1998, 85 p.

144. Distribution of Atlantic menhaden, *Brevoortia tyrannus*, purse-seine sets and catches from southern New England to North Carolina, 1985-96, by Joseph W. Smith. March 1999, 22 p.

145. Distribution patterns of fish eggs in the U.S. northeast continental shelf ecosystem, 1977-1987, by Peter Berrien and John Sibunka. June 1999, 310 p.

146. Synopsis of biological data on the Nassau grouper, *Epinephelus striatus* (Bloch, 1792), and the jewfish, *E. itajara* (Lichtenstein, 1822), by Yvonne Sadovy and Anne-Marie Eklund. July 1999, 65 p.

147. Investigation of unusual mortalities of bottlenose dolphins along the mid-Texas coastal bay ecosystem during 1992, by A. A. Colbert, G. I. Scott, M. H. Fulton, E. F. Wirth, J. W. Daugomah, P. B. Key, E. D. Strozier, and S. B. Galloway. November 1999, 23 p.

148. The distribution and size composition of finfish, American lobster, and long-finned squid in Long Island Sound based on the Connecticut Fisheries Division Bottom Trawl Survey, 1984-1994, by Kurt F. Gottschall, Mark W. Johnson, and David G. Simpson. February 2000, 195 p.

149. Population characteristics of Gulf menhaden, *Brevoortia patronus*, by Douglas S. Vaughan, Joseph W. Smith, and Michael H. Prager. April 2000, 19 p.

150. Relationship between fish size and otolith length for 63 species of fishes from the eastern North Pacific Ocean, by James T. Harvey, Thomas R. Loughlin, Michael A. Perez, and Dion S. Oxman. August 2000, 36 p.

NOAA Technical Reports NMFS

Technical Reports of the *Fishery Bulletin*

Guide for Contributors

Preparation

Title page should include authors' full names and mailing addresses and the senior author's telephone and FAX number.

Abstract should not exceed one double-spaced typed page. It should state the main scope of the research but emphasize its conclusions and relevant findings. Because abstracts are circulated by abstracting agencies, it is important that they represent the research clearly and concisely.

Text must be typed double-spaced throughout. A brief introduction should portray the broad significance of the paper; the remainder of the paper should be divided into the following sections: **Materials and methods, Results, Discussion** (or **Conclusions**), and **Acknowledgments**. Headings within each section must be short, reflect a logical sequence, and follow the rules of multiple subdivision (i.e. there can be no subdivision without at least two items). The entire text should be intelligible to interdisciplinary readers; therefore, all acronyms, abbreviations, and technical terms should be spelled out the first time they are mentioned. The scientific names of species must be written out the first time they are mentioned; subsequent mention of scientific names may be abbreviated. Follow the *U.S. Government Printing Office Style Manual* (1984 ed.) and the *CBE Style Manual* (5th ed.) for editorial style, and the most current issue of the *American Fisheries Society's Common and Scientific Names of Fishes from the United States and Canada* for fish nomenclature. Dates should be written as follows: 11 November 1991. Measurements should be expressed in metric units, e.g., metric tons as (t); if other units of measurement are used, please make this fact explicit to the reader. The numeral one (1) should be typed as a one, not as a lower-case el (l).

Text footnotes should be numbered with Arabic numerals and typed on a separate sheet of paper. Footnote all personal communications, unpublished data, and unpublished manuscripts with full address of the communicator or author, or, as in the case of unpublished data, where the data are on file. Authors are advised to avoid references to nonstandard (gray) literature, such as internal, project, processed, or administrative reports, wherever possible. Where these references are used, please include whether they are available from NTIS (National Technical Information Service) or from some other public depository.

Literature cited comprises published works and those accepted for publication in peer-reviewed literature (in press). Follow the name and year system for citation format. In the text, cite Smith and Jones (1977) or (Smith and Jones, 1977). If there is a sequence of citations, list chronologically: Smith, 1932; Green, 1947; Smith and Jones, 1985. Abbreviations of serials should conform to abbreviations given in *Serial Sources for the BIOSIS Previews Database*. Authors are responsible for the accuracy and completeness of all citations.

Tables should not be excessive in size and must be cited in numerical order in the text. Headings should be short but ample enough to allow the table to be intelligible on its own. All unusual symbols must be explained in the table heading. Other incidental comments may be footnoted with italic numerals. Use asterisks for probability in statistical data. Because tables are typeset, they need only be submitted typed and formatted, with double-spaced legends. Zeros should precede all decimal points for values less than one.

Figures include line illustrations and photographs (or slides) and must be cited in numerical order in the text. Unless photographs are submitted on glossy paper with good contrast, we cannot guarantee a good final printed copy. Figures are to be labeled with author's name and number of figure. Use Times Roman font (upper and lowercase letters) to label within figures. Avoid vertical lettering except for *y*-axis labels. Zeros should precede all decimal points for values less than one. Figures may be submitted as computer software files (along with laser-printed copies), as photo-mechanical transfers (PMTs), or as high quality photographic prints. Send only xerox copies of figures to the Scientific Editor; original figures will be requested later when the manuscript has been accepted for publication. Figure legends should explain all symbols and abbreviations and should be double-spaced on a separate page at the end of the manuscript.

Copyright law does not cover government publications; they fall within the public domain. If an author reproduces any part of a government publication in his work, reference to source is considered correct form.

Submission

Send printed copies (original and three copies) to the Scientific Editor:

Dr. John V. Merriner, Scientific Editor
National Marine Fisheries Service, NOAA
Center for Coastal Fisheries and Habitat Research, NOS
101 Pivers Island Road
Beaufort, NC 28516

Once the manuscript has been accepted for publication, you will be asked to submit a software copy of your manuscript to the Managing Editor. The software copy should be submitted in WordPerfect or Word format and should be placed on a 3.5-inch disk that is double-sided, double or high density, and that is compatible with DOS/Windows systems. Note: We are no longer able to accept ASCII text files.

Copies of published reports (and articles within multi-authored reports) are available free of charge to the senior author (50 copies) and to his or her laboratory (50 copies). Additional copies may be purchased in lots of 100 when the author receives page proofs.

UNITED STATES
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC
ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SCIENTIFIC PUBLICATIONS OFFICE
BIN C15700
SEATTLE, WA 98115
OFFICIAL BUSINESS
Penalty for Private Use, $300

PRSRT STD
POSTAGE & FEES PAID
U.S. DEPARTMENT OF COMMERCE
PERMIT NO. G-19

Library
NOAA, National Marine Fisheries Service
SWFC Honolulu Laboratory F/SWC2
2570 Dole Street
Honolulu, HI 96822-2396

NOAA SCIENTIFIC AND TECHNICAL PUBLICATIONS

The National Oceanic and Atmospheric Administration was established as part of the Department of Commerce on October 13, 1970. The mission responsibilities of NOAA are to assess the socioeconomic impact of natural and technological changes in the environment and to monitor and predict the state of the solid Earth, the oceans and their living resources, the atmosphere, and the space environment of the Earth.

The major components of NOAA regularly produce various types of scientific and technical information in the following kinds of publications:

PROFESSIONAL PAPERS—Important definitive research results, major techniques, and special investigations.

CONTRACT AND GRANT REPORTS—Reports prepared by contractors or grantees under NOAA sponsorship.

ATLAS—Presentation of analyzed data generally in the form of maps showing distribution of rainfall, chemical and physical conditions of oceans and atmosphere, distribution of fishes and marine mammals, ionospheric conditions, etc.

TECHNICAL SERVICE PUBLICATIONS—Reports containing data, observations, instructions, etc. A partial listing includes data serials; predictions and outlook periodicals; technical manuals, training papers, planning reports, and information serials; and miscellaneous technical publications.

TECHNICAL REPORTS—Journal quality with extensive details, mathematical developments, or data listings.

TECHNICAL MEMORANDUMS—Reports of preliminary, partial, or negative research or technology results, interim instructions, and the like.

Information on availability of NOAA publications can be obtained from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

☆ U. S. GOVERNMENT PRINTING OFFICE: 2001 PROG 2057-S/80016